ECONOMICS OF DEFENSE POLICY:
ADM. H. G. RICKOVER

HEARING

BEFORE THE

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

NINETY-SEVENTH CONGRESS

SECOND SESSION

PART 2

SELECTED CONGRESSIONAL TESTIMONY AND SPEECHES BY
ADM. H. G. RICKOVER, 1953–81

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THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY.

STATEMENT OF
ADMIRAL H.G. RICKOVER, USN
BEFORE THE
SUBCOMMITTEE ON GENERAL OVERSIGHT AND RENEGOTIATION
OF THE
HOUSE COMMITTEE ON BANKING, FINANCE, AND URBAN AFFAIRS
MARCH 22, 1979

MR. CHAIRMAN, THIS COMMITTEE HAS HEARD ARGUMENTS ABOUT RENEGOTIATION, PRO AND CON, FOR FOUR YEARS. ON THE ONE HAND, DEFENSE CONTRACTOR LOBBYISTS SEEK TO ABOLISH THE RENEGOTIATION BOARD. THEY CONTEND THAT RENEGOTIATION REPRESENTS UNNECESSARY GOVERNMENT REGULATION OF DEFENSE INDUSTRY; THAT DEFENSE DEPARTMENT PROCUREMENT PROCEDURES PROVIDE ADEQUATE ASSURANCE AGAINST EXCESSIVE PROFITS; THAT THE ADMINISTRATIVE COST OF FILING PROFIT REPORTS EXCEEDS THE BOARD'S RECOVERY OF EXCESSIVE PROFITS; AND THAT RENEGOTIATION ACTUALLY INCREASES THE COST OF GOVERNMENT PURCHASES. THESE LOBBYISTS HAVE SUCCESSFULLY BLOCKED EFFORTS TO STRENGTHEN RENEGOTIATION AND NOW SEEK TO ABOLISH IT ALTOGETHER.

ON THE OTHER HAND, THE PROPONENTS OF RENEGOTIATION, INCLUDING MYSELF, POINT OUT THAT A LARGE PORTION OF DEFENSE PROCUREMENT IS NON-COMPETITIVE; THAT IN WHAT IS OFTEN A SELLER'S MARKET, DEFENSE PROCUREMENT PROCEDURES DO NOT PRECLUDE A CONTRACTOR FROM EFFECTIVELY DICTATING PRICES; THAT IT IS WRONG TO ABOLISH AN AGENCY WHICH ACTS TO DETER DEFENSE PROFITEERING, AND HAS, HISTORICALLY, RECOVERED FAR MORE FOR THE TREASURY THAN IT SPENDS. IN THE PAST 12 MONTHS, FOR EXAMPLE, THE BOARD HAS MADE EXCESSIVE PROFIT DETERMINATIONS TOTALING $82 MILLION. THE RENEGOTIATION BOARD ACCOMPLISHED THIS ON A $6 MILLION ANNUAL BUDGET DESPITE A SHARPLY DECLINING STAFF DUE TO THE CONGRESSIONALLY IMPOSED FUNDING CUTOFF DATE OF MARCH 31, 1979.

UNFORTUNATELY, NOT MANY MEMBERS OF CONGRESS ARE ABLE TO TAKE THE TIME TO FAMILIARIZE THEMSELVES WITH THE DETAILS OF RENEGOTIATION, AND EVALUATE THE ARGUMENTS ON THEIR MERITS. EVEN ON THIS SUBCOMMITTEE, WHICH HAS HELD EXTENSIVE HEARINGS OVER MANY YEARS, NEW MEMBERS PROBABLY HAVE NOT HAD TIME TO STUDY THE PROBLEM.

THERE IS NOT GREAT PUBLIC SENTIMENT ON THIS ISSUE BECAUSE THE ISSUE IS COMPLEX AND NOT EASILY UNDERSTOOD. THOSE WHO ARE AGAINST RENEGOTIATION CAN ASSOCIATE THEMSELVES WITH THE POPULAR VIEW OF PARING DOWN THE FEDERAL GOVERNMENT. THOSE IN FAVOR OF RENEGOTIATION EMPHASIZE THE NEED TO PROTECT THE PUBLIC AGAINST OVERCHARGING ON DEFENSE CONTRACTS AND SHOW THE INCOME-PRODUCING NATURE OF THE BOARD.

THE PROBLEM MEMBERS OF CONGRESS FACE BOILS DOWN TO THE QUESTION OF WHOM TO BELIEVE; WHICH COURSE OF ACTION BEST SERVES THE PUBLIC INTEREST. IN THIS REGARD, YOU SHOULD EXERCISE THE ABILITY MEMBERS OF CONGRESS HAVE TO JUDGE WITNESSES AND THEIR MOTIVES.

IT IS EASY TO DISCERN THE MOTIVES OF THE DEFENSE CONTRACTOR LOBBY. CERTAINLY, WITHOUT RENEGOTIATION, DEFENSE CONTRACTORS WILL HAVE A FEW LESS FORMS TO FILL OUT. BUT TO A LARGE CONTRACTOR THAT EFFORT IS INSIGNIFICANT. MOREOVER, SMALL

CONTRACTORS WILL BE EXEMPT IF CONGRESS EXTENDS THE ACT AS RECOMMENDED BY CHAIRMAN MINISH.

I ALSO DOUBT THAT WHAT MOTIVATES THE LOBBYISTS IS THE PROSPECT OF ELIMINATING 200 FEDERAL EMPLOYEES. IF THEY WERE GENUINELY INTERESTED IN CUTTING BACK THE FEDERAL BUREAUCRACY, THEY WOULD FOCUS ON LARGE AGENCIES SUCH AS THE PENTAGON OR THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE. WHAT THEY REALLY WANT IS TO ABOLISH THE GOVERNMENT'S STATUTORY RIGHT TO RECOUP EXCESSIVE PROFITS ON DEFENSE CONTRACTS. THEY ALSO WANT TO ABSOLVE CONTRACTORS FROM LIABILITY TO REFUND ANY EXCESSIVE PROFITS THAT EXIST IN THE BOARD'S $150 BILLION BACKLOG OF UNPROCESSED CASES. THIS BACKLOG CONSISTS OF CONTRACTS PERFORMED PRIOR TO SEPTEMBER 30, 1976, WHEN THE RENEGOTIATION ACT EXPIRED.

YOU SHOULD RECOGNIZE THAT NEARLY ALL THE WITNESSES TESTIFYING AGAINST RENEGOTIATION HAVE BEEN SPOKESMEN FOR INDUSTRY ASSOCIATIONS. THEIR JOB IS SIMPLE: PROMOTE INDUSTRY INTERESTS. THEIR SPEECHES TEND TO BE THE SAME REGARDLESS OF THE ISSUE. THEY CONSTANTLY ADVOCATE ELIMINATION OF GOVERNMENT REGULATION AND CUTBACKS IN GOVERNMENT PERSONNEL. BUT THEY WOULD CONTINUE AND ADD PROGRAMS FOR INCREASED GOVERNMENT SPENDING IN AREAS THAT INTEREST THEM. REMEMBER THEIR LOBBYING TO RETAIN GOVERNMENT REGULATION OF AIRLINES, WHEN THE GOVERNMENT WANTED TO DO AWAY WITH IT?

SOME REPRESENTATIVES OF SMALL BUSINESS HAVE SPOKEN AGAINST THE BOARD. THAT IS TO BE EXPECTED, SINCE FOR MANY YEARS THE RENEGOTIATION PROCESS WAS MOST EFFECTIVE AGAINST SMALL CONTRACTORS; THE VERY ONES UNABLE TO TAKE ADVANTAGE OF SPECIAL INTEREST AND ACCOUNTING LOOPHOLES THAT LARGER FIRMS ARE ABLE TO EXPLOIT.

By exempting truly small businesses from renegotiation, however, the proposed Minish Bill would eliminate their concern.

For the benefit of members who may not already know it, large companies frequently stimulate much of the interest expressed by small businesses in pending legislation when the legislation could affect big business. They do this by soliciting support from their suppliers. With your permission, Mr. Chairman, I would like to introduce for the record a letter one large defense contractor used in urging his suppliers to contact members of Congress in opposition to the Minish Bill. The letter even suggested arguments the small companies could make.

In contrast to the defense lobby, many prominent Government officials and organizations have expressed strong support for renegotiation and urged extension and strengthening of the Act. In addition to members of the House Banking Committee, these include President Carter, the Secretary of Defense, the Comptroller General, the House Government Operations Committee, the Commission on Government Procurement, and the staff of the Joint Committee on Internal Revenue Taxation. None of these has any vested interest in the renegotiation debate other than what is best for the United States.

The Comptroller General, the House Government Operations Committee, the Commission on Government Procurement, and the staff of the Joint Internal Revenue Taxation Committee, all have made extensive studies of the renegotiation process. They endorse the need for renegotiation and have recommended reforms. The President and the Secretary of Defense also strongly endorse the Renegotiation Act, and stress the need to assure that no one makes excessive profits from our defense spending.

My own involvement in renegotiation started in the 1960's in connection with an entirely different matter. At that time I had testified numerous times regarding the need for Cost Accounting Standards in defense contracts. I cited case after case from personal experience to illustrate that, in the absence of such standards, it was virtually impossible to determine what defense equipment actually cost to produce, or what profit contractors made in producing it. Congressman Henry Gonzales and former House Banking Committee Chairman Wright Patman initiated legislation which eventually resulted in the establishment of the Cost Accounting Standards Board. That Board exists today as an arm of the legislative branch and is chaired by the Comptroller General. The Board has established standards which have helped reduce accounting abuses in the defense industry.

While Congress was considering legislation to establish the Cost Accounting Standards Board, the usual band of defense lobbyists were opposing it. Ironically, they claimed that Cost Accounting Standards were unnecessary because the Renegotiation Board would catch any excessive profits slipping through the procurement process. Now they point to the Cost Accounting Standards Board as a reason why renegotiation is unnecessary.

I decided to look into the renegotiation process to see just how effective it was. At that time the Board operated in such secrecy that even the General Accounting Office was not

GIVEN ACCESS TO ITS FILES. NONETHELESS, BY LOOKING AT THE BOARD'S RESULTS AND BY REVIEWING THE RENEGOTIATION ACT AND BOARD REGULATIONS, IT WAS OBVIOUS THAT THE BOARD WAS NOT ANYWHERE NEARLY AS EFFECTIVE AS IT SHOULD BE.

ONE REASON FOR THE BOARD'S INEFFECTIVENESS WAS THAT FOR YEARS IT HAD BEEN STAFFED BY POLITICAL HACKS. MOREOVER, THE ACT ITSELF WAS FULL OF LOOPHOLES. OVER THE YEARS, SPECIAL INTEREST GROUPS HAD MANAGED TO WRITE THEMSELVES OUT OF THE ACT OR INSERT LOOPHOLES THAT HAD THE SAME EFFECT. AS A RESULT, THE RENEGOTIATION BOARD WAS RECOVERING EXCESSIVE PROFITS PRIMARILY FROM SMALL BUSINESS CONCERNS; THE LARGE DEFENSE CONTRACTORS WERE EFFECTIVELY IMMUNE.

CONGRESSMAN GONZALEZ MADE NUMEROUS SPEECHES IN CONGRESS IN AN EFFORT TO AROUSE CONGRESSIONAL CONCERN. IN 1969 I TESTIFIED AT LENGTH TO THE HOUSE GOVERNMENT OPERATIONS COMMITTEE. THAT COMMITTEE ISSUED A STRONG REPORT WHICH SPELLED OUT THE URGENT NEED TO STRENGTHEN THE RENEGOTIATION ACT AND HIGHLIGHTED THE INEQUITIES IN THE PROCESS, PARTICULARLY VIS A VIS LARGE AND SMALL CONTRACTORS. SENATOR PROXMIRE IN THE SENATE ALSO PUSHED FOR LEGISLATIVE REFORM OF THE RENEGOTIATION ACT. BOTH THE JOINT ECONOMIC COMMITTEE AND THE SENATE APPROPRIATIONS COMMITTEE HELD EXTENSIVE HEARINGS.

SINCE THE RENEGOTIATION ACT IS NOT PERMANENT LEGISLATION, IT HAS HAD TO COME TO CONGRESS FOR RENEWAL EVERY FEW YEARS. UNFORTUNATELY, THE HOUSE WAYS AND MEANS COMMITTEE AND THE SENATE FINANCE COMMITTEE, WHICH AT THAT TIME HAD LEGISLATIVE COGNIZANCE OVER THE ACT, WERE USUALLY BUSY WITH TAX MATTERS AND DID NOT GET INVOLVED MUCH WITH RENEGOTIATION. SEVERAL

EFFORTS TO STRENGTHEN THE ACT DURING THE RENEWAL PROCESS RESULTED IN COMPROMISE AGREEMENTS ON THE FLOOR, OR IN CONFERENCE, WHEREBY THE ACT WOULD BE RENEWED, AS IS, WHILE ANOTHER STUDY WAS STARTED. AS A RESULT OF THESE EXTENSIONS, THE STAFF OF THE JOINT COMMITTEE ON INTERNAL REVENUE TAXATION, WAS DIRECTED TO STUDY THE RENEGOTIATION PROCESS. THE COMPTROLLER GENERAL ALSO REVIEWED THE BOARD'S OPERATIONS. AFTER CAREFUL STUDY, BOTH SUPPORTED THE NEED FOR RENEGOTIATION, AND RECOMMENDED REFORMS.

IN 1975 LEGISLATIVE COGNIZANCE FOR THE RENEGOTIATION ACT WAS SHIFTED FROM THE HOUSE WAYS AND MEANS COMMITTEE TO THE HOUSE BANKING COMMITTEE, WHERE IT WAS ASSIGNED TO THE MINISH SUB-COMMITTEE. YOUR CHAIRMAN HAS HELD EXTENSIVE HEARINGS, TAKING TESTIMONY FROM NUMEROUS GOVERNMENT AND INDUSTRY WITNESSES. BASED ON THOSE HEARINGS, THE COMMITTEE DRAFTED A COMPREHENSIVE REFORM BILL AIMED AT MAKING RENEGOTIATION AN EFFECTIVE SAFEGUARD AGAINST EXCESSIVE PROFITS BY LARGE AS WELL AS SMALL DEFENSE CONTRACTORS.

THE MINISH BILL PASSED THE HOUSE OVERWHELMINGLY BUT WAS BOTTLED UP IN THE SENATE FINANCE COMMITTEE WHICH AT THE TIME WAS PREOCCUPIED WITH A MAJOR TAX REFORM BILL. IN THE CLOSING HOURS OF THAT SESSION OF CONGRESS THE SENATE FINANCE COMMITTEE WAS PREPARED TO INTRODUCE A BILL FOR A SIMPLE EXTENSION OF THE RENEGOTIATION ACT. SENATOR PROMXIRE, HOWEVER, HAD CONSIDERABLE SUPPORT FOR HIS PROPOSED AMENDMENT TO ADOPT THE HOUSE BILL. AS A RESULT, THE BILL FOR A SIMPLE EXTENSION OF THE RENEGOTIATION ACT WAS NEVER BROUGHT TO A VOTE. THUS, THE EXPIRATION OF THE RENEGOTIATION ACT ON SEPTEMBER 30, 1976 WAS NOT THE RESULT OF ANY CONGRESSIONAL CONSENSUS THAT THE BOARD SHOULD BE ABOLISHED.

Rather, it expired because those who did not want a strengthened Renegotiation Act were successful in keeping the issue from coming to the Senate floor for a vote.

This "near miss" served to mobilize defense contractors to mount a greater effort in the 95th Congress. The House Banking Committee again voted for strong reform legislation. The Senate Banking Committee, which had assumed legislative cognizance for the Act, by a narrow margin passed a bill to put the Board in standby to be reactivated only in time of war.

The defense lobby then persuaded the Appropriations Committees to cut off funding for the Board, effective March 31, 1979. Although the Act had expired September 30, 1976, the Board was legally required to continue processing its $150 billion backlog of contracts awarded prior to that date. By arranging to cut off funds for the Board, the defense lobby could block the Board from completing its review of outstanding cases.

In his FY 1979 supplemental budget request, the President included funds for continued operation of the Board. To date, Congress has not acted on this request. Apparently the Appropriations Committees are awaiting action by your committee.

The bill before you today is not the reform legislation the House Banking Committee previously endorsed. It is no more than a simple extension of the Renegotiation Act in its present form, but with an increased exemption for small businesses. The loopholes that benefit large contractors and special interest groups would remain. Nonetheless, I endorse this bill in order to keep the Board alive and to ensure that the Government retains its statutory rights, under the Renegotiation Act, to recoup excessive profits on defense contracts. A competent, PROPERLY STAFFED BOARD CAN PROVIDE CONSIDERABLE PROTECTION TO THE PUBLIC, EVEN UNDER THE PRESENT WEAK LAW.

THE BOARD HAS MADE MISTAKES. FOR MANY YEARS IT HAS HAD INCOMPETENT TIME-SERVERS. NONETHELESS, DURING THE PAST 12 MONTHS AND UNDER TRYING CONDITIONS IT HAS MADE CONSIDERABLE PROGRESS, AND HAS MADE EXCESS PROFITS DETERMINATIONS OF $82 MILLION. THIS AMOUNT INCLUDES DETERMINATIONS AGAINST LARGE CONTRACTORS.

THE HISTORY OF THE EFFORT TO STRENGTHEN THE RENEGOTIATION ACT ILLUSTRATES THE POWER AND INFLUENCE LARGE CORPORATIONS BRING TO BEAR ON THE LEGISLATIVE PROCESS, AND THE DIFFICULT ROAD THAT LIES AHEAD FOR THOSE WHO DARE CHALLENGE THE SPECIAL PRIVILEGES OF BIG BUSINESS.

AS LONG AS THE BOARD WAS RECOVERING ONLY A FEW MILLION DOLLARS EACH YEAR, MOSTLY FROM SMALL CONTRACTORS, THE DEFENSE LOBBY WAS NOT MUCH CONCERNED ABOUT RENEGOTIATION. BUT FACED WITH THE PROSPECTS OF A MORE EFFECTIVE RENEGOTIATION PROCESS, THE DEFENSE LOBBY MOBILIZED. INSTEAD OF STRENGTHENING RENEGOTIATION, CONGRESS HAS BEEN MANEUVERED TO THE POINT WHERE IT IS NOW ON THE VERGE OF KILLING IT.

COMPETITION IN DEFENSE PROCUREMENT IS INADEQUATE TO PREVENT CONTRACTORS FROM REALIZING EXCESSIVE PROFITS. THE NEED FOR EFFECTIVE RENEGOTIATION DOES NOT HINGE ON AVERAGE PROFIT LEVELS IN DEFENSE INDUSTRY. WHY SHOULD THOSE COMPANIES WHO ARE MAKING EXCESSIVE PROFITS BE ABLE TO HIDE BEHIND INDUSTRY AVERAGES? WE ALL KNOW THAT INDUSTRY PROFIT AVERAGES IN THE MID-1970'S, FOR EXAMPLE, WERE NOT INDICATIVE OF THE PROFITS BEING MADE BY THE OIL COMPANIES.

Procurement safeguards at the time of contract award do not preclude the possibility of excessive profits. Frequently the Government finds itself in a seller's market, or sole source situation, where sometimes contractors can dictate prices and terms and conditions even when their capability to perform the work was developed at Government expense on defense-financed contracts.

The Department of Defense does not have access to the company's books and records to the extent the Renegotiation Board has. The DOD cannot review the information or profit data reported to the Internal Revenue Service. It cannot effectively evaluate a contractor's profit in terms of return on investment or other criteria available to the Board and which it is required to evaluate. Further, there has always been a tendency by some Defense Department employees to side with their contractors.

The public desires reductions in Government spending and reducing waste in Government. Twenty-eight states have called for a Constitutional Convention for the purpose of an amendment to require a balanced budget. The elimination of the 200-man Renegotiation Board would save about $6 million a year. But in return, the Government must forego hundreds of millions of dollars in excess profit recovery.

The $82 million the Board has found in the last 12 months is a drop in the bucket compared to what it would be able to recover if permitted to operate on an effective basis. The idea that defense contractors have to spend large sums calculating

PROFIT FIGURES FOR THE BOARD IS NONSENSE. THEY WELL KNOW WHAT PROFIT THEY ARE MAKING ON DEFENSE CONTRACTS.

THE IDEA THAT COMPANIES WILL CUT COSTS AND LOWER PRICES IF RENEGOTIATION IS ABOLISHED IS WRONG. THAT ARGUMENT IS TANTAMOUNT TO SAYING THAT GOVERNMENT SPENDING WOULD BE REDUCED BY THE PRO RATA COST OF YOUR SALARIES, AND SAVINGS IN OVERHEAD COSTS WOULD RESULT IF THIS SUBCOMMITTEE DID NOT MEET TODAY.

DEFENSE CONTRACTORS WHO HAVE BEEN DEALING HONORABLY WITH THE GOVERNMENT AND NOT MAKING EXCESSIVE PROFITS SHOULD NOT OBJECT TO ESTABLISHING THAT FACT BEFORE THE RENEGOTIATION BOARD. THAT SOME OF THESE CONTRACTORS FIND THE BOARD THREATENING IS REASON TO QUESTION THEIR MOTIVES.

IN THIS CONNECTION IT IS WORTH REMINDING YOU OF A JEWISH RELIGIOUS TRADITION. THIS HOLDS THAT IT IS A PRIMARY OBLIGATION TO REFASHION THE WORLD INTO GOD'S KINGDOM. THIS TRADITION TELLS US THAT THE FIRST QUESTION TO BE ASKED OF US ON JUDGMENT DAY WILL BE: WERE YOU HONEST IN YOUR BUSINESS DEALINGS--IN WHICH TO DO JUSTLY TAKES PRECEDENCE EVEN OVER LOVING MERCY. AND ONLY AFTER JUSTICE AND MERCY HAVE BEEN CARRIED OUT DOES IT MAKE ANY SENSE TO TALK OF WALKING HUMBLY OR IN ANY OTHER WAY WITH GOD.

THE RENEGOTIATION BOARD TODAY FACES EXTINCTION. THIS IS A SAD COMMENTARY ON THE INFLUENCE LARGE CORPORATIONS AND THEIR LOBBYISTS CAN EXERT ON THE LEGISLATIVE PROCESS. AN EFFORT TO EXTEND AND STRENGTHEN THE RENEGOTIATION BOARD HAS BEEN TURNED AROUND SO THAT THE BOARD IS NOW IN DANGER OF BEING ABOLISHED.

In so doing, defense lobbyists apparently have been able to persuade some members of Congress to adopt the defense industry viewpoint over the recommendations of the President, the Secretary of Defense, the Commission on Government Procurement, the Comptroller General and numerous Congressional committees.

I have tried to make this committee aware of what is going on. For the good of our people, I trust that Congress will act promptly--before the March 31, 1979 funding cutoff date--to save the Renegotiation Board.

THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY.

STATEMENT OF
ADMIRAL H.G. RICKOVER, USN
BEFORE THE
SUBCOMMITTEE ON INVESTIGATIONS
OF THE
HOUSE COMMITTEE ON ARMED SERVICES
JUNE 25, 1980

Mr. Chairman, you asked me for my views on HR 7247 which would excuse defense contractors from the profit limits of the Vinson-Trammell Act from September 30, 1976, thru October 1, 1981. The House Armed Services Committee in conference with the Senate will soon be faced with a decision on whether or not to adopt a similar provision which appears in the Senate Armed Services Committee version of the FY 1981 Defense Authorization Act.

I strongly recommend that this committee not endorse HR 7247 nor agree to similar provisions in conference with the Senate. If Congress exempts contractors, even temporarily, from the Vinson-Trammell Act, in the absence of an effective substitute, it would become very difficult, if not impossible to reinstate or strengthen the Act or other profit limiting legislation.

Historically, Congress has endorsed the principle that making excessive profits on defense contracts is contrary to the public interest. The issue now before Congress is whether it intends to retreat from this fundamental principle. As one who has been involved in defense procurement since before World War II, I can think of few things that would be more injurious to the defense procurement process and as costly to the American taxpayer, than for the Congress of the United States to condone, by word or deed, excessive profits on defense

CONTRACTS.

THE PROBLEM OF ELIMINATING EXCESSIVE PROFITS ON DEFENSE CONTRACTS IS AS OLD AS THE COUNTRY ITSELF. GEORGE WASHINGTON SAID ABOUT REVOLUTIONARY WAR PROFITEERS:

> "THE MATTER I ALLUDE TO IS THE EXORBITANT PRICE EXACTED BY MERCHANTS AND VENDORS OF GOODS FOR EVERY NECESSARY THEY DISPOSE OF. I AM SENSIBLE THAT THE TROUBLE AND RISK IN IMPORTING GIVE THE ADVENTURERS A RIGHT TO A GENEROUS PRICE, AND THAT SUCH, FROM THE MOTIVES OF POLICY, SHOULD BE PAID; BUT YET I CANNOT CONCEIVE THAT THEY, IN DIRECT VIOLATION OF EVERY PRINCIPLE OF GENEROSITY, OF REASON AND JUSTICE, SHOULD BE ALLOWED, IF IT IS POSSIBLE TO RESTRAIN 'EM, TO AVAIL THEMSELVES OF DIFFICULTIES OF THE TIMES, AND TO AMASS FORTUNES UPON THE PUBLIC RUIN."

DURING THE SPANISH-AMERICAN WAR, CONGRESS TRIED TO LEGISLATE AGAINST EXCESSIVE PROFITS ON STEEL, WHICH CONTRACTORS WERE SELLING TO THE WAR DEPARTMENT AT AN EXORBITANT PRICE. CONGRESS SET A MAXIMUM PRICE FOR SUCH SALES, BUT, THE STEELMAKERS COUNTERED BY REFUSING TO SELL STEEL TO THE GOVERNMENT. UNDER THE PRESSURE OF WAR, CONGRESS EVENTUALLY HAD TO RESCIND THIS LAW.

DURING WORLD WAR I, CONGRESS SOUGHT TO LIMIT PROFITS THROUGH COST-PLUS CONTRACTS, CONTROL OF RAW MATERIAL PRICES, AND AN EXCESS PROFIT TAX. NONE OF THESE WORKED.

IN 1934, CONGRESS, IN PASSING THE VINSON-TRAMMELL ACT, SET PROFIT LIMITS ON DEFENSE CONTRACTS FOR SHIPS, AIRCRAFT AND THEIR COMPONENTS. IN 1942, THIS ACT WAS SUSPENDED IN FAVOR OF THE RENEGOTIATION ACT AND AN EXCESS PROFIT TAX. THE RENEGOTIATION ACT GAVE THE GOVERNMENT AUTHORITY TO RECOUP EXCESSIVE PROFITS ON A MUCH WIDER RANGE OF CONTRACTS. UNDER RENEGOTIATION, FACTORS OTHER THAN JUST PROFIT PERCENTAGE WERE CONSIDERED IN DETERMINING WHETHER A

CONTRACTOR'S PROFITS WERE EXCESSIVE.

IN ITS MOST RECENT FORM, THE RENEGOTIATION ACT REMAINED IN EFFECT FROM 1951 TO 1976 AS TEMPORARY LEGISLATION WHICH CONGRESS REVIEWED EVERY TWO OR THREE YEARS. IN 1976, THE HOUSE APPROVED A BILL TO STRENGTHEN THE RENEGOTIATION ACT BUT IT DIED IN THE SENATE FINANCE COMMITTEE WHERE IT WAS NEVER BROUGHT TO A VOTE. THE RENEGOTIATION ACT ITSELF EXPIRED WHEN THOSE IN THE SENATE WHO OPPOSED THE HOUSE BILL WERE SUCCESSFUL IN KEEPING EVEN A BILL FOR ROUTINE EXTENSION OF THE RENEGOTIATION ACT FROM COMING TO THE FLOOR FOR A VOTE.

SINCE THEN, OPPONENTS OF RENEGOTIATION HAVE BEEN ABLE TO BLOCK EFFORTS TO REVIVE THE RENEGOTIATION ACT-JUST AS I AM CONVINCED THEY WOULD BE ABLE TO BLOCK EFFORTS TO REVIVE OR STRENGTHEN THE VINSON-TRAMMELL ACT IF CONGRESS EVER SUSPENDED IT.

DEFENSE LOBBYISTS WERE ABLE TO PERSUADE THE APPROPRIATION COMMITTEES TO CUT OFF THE RENEGOTIATION BOARD'S FUNDS AS OF MARCH 31, 1979. AT THE TIME THE BOARD WENT OUT OF BUSINESS, THERE WAS A $150 BILLION BACKLOG OF DEFENSE CONTRACTS THAT HAD NOT YET BEEN SCREENED FOR EXCESSIVE PROFITS.

WHEN THE RENEGOTIATION ACT EXPIRED ON SEPTEMBER 30, 1976, THE VINSON-TRAMMELL ACT ONCE AGAIN BECAME APPLICABLE TO DEFENSE PROCUREMENTS. ALTHOUGH THE INTERNAL REVENUE SERVICE IS RESPONSIBLE TO IMPLEMENT THE VINSON-TRAMMELL ACT, THAT AGENCY HAS BEEN PROCRASTINATING-APPARENTLY IN THE HOPE THAT CONGRESS WILL REPEAL THE ACT. IT DID NOT PUBLISH THE PROPOSED IMPLEMENTING REGULATIONS FOR PUBLIC COMMENT UNTIL OCTOBER 1979 - MORE THAN THREE YEARS AFTER THE LAW WENT INTO EFFECT.

MOREOVER, THE INTERNAL REVENUE SERVICE HAS REPEATEDLY POSTPONED THE DATE FOR CONTRACTORS TO FILE UNDER THE VINSON-TRAMMELL ACT. THE

LATEST EXTENSION SPECIFIES A FILING DATE OF OCTOBER 15, 1980. APPARENTLY DEFENSE CONTRACTORS EXERT CONSIDERABLE INFLUENCE AT THE INTERNAL REVENUE SERVICE AS THEY DO IN THE DEFENSE DEPARTMENT.

THE OBJECTIVE OF THE DEFENSE INDUSTRY IS CLEAR - TO ELIMINATE OR NEUTRALIZE AS MANY PROCUREMENT SAFEGUARDS AS THEY CAN. IT IS WORTH REMEMBERING THAT WHEN CONGRESS WAS CONSIDERING LEGISLATION TO ESTABLISH THE COST ACCOUNTING STANDARDS BOARD, THE DEFENSE INDUSTRY LOBBYISTS SAID THE BOARD WAS UNNECESSARY BECAUSE THE RENEGOTIATION ACT PRECLUDED EXCESSIVE PROFITS. LATER, THESE SAME DEFENSE INDUSTRY LOBBYISTS POINTED TO THE EXISTENCE OF THE COST ACCOUNTING STANDARDS BOARD AS ONE OF THE SAFEGUARDS THAT PERMITTED REPEAL OF THE RENEGOTIATION ACT. NOW THAT THE RENEGOTIATION BOARD HAS BEEN ABOLISHED, THESE LOBBYISTS ARE TRYING TO KILL BOTH THE VINSON-TRAMMELL ACT AND THE COST ACCOUNTING STANDARDS BOARD.

THE NEED FOR CONGRESS TO PROVIDE FOR RECOVERY OF EXCESSIVE PROFITS ON DEFENSE CONTRACTS ARISES BECAUSE THERE IS LITTLE OR NO COMPETITION FOR MOST MAJOR DEFENSE HARDWARE. THE DEFENSE DEPARTMENT IS OFTEN IN A TAKE-IT-OR-LEAVE-IT SITUATION WITH MANY OF ITS MAJOR PROGRAMS. LARGE ONE-TIME COSTS OFTEN PRECLUDE DEVELOPING ALTERNATE SOURCES FOR FOLLOW ORDERS. ALTHOUGH THERE MAY BE SOME NEGOTIATION IN ARRIVING AT THE FINAL FIGURES, THE GOVERNMENT OFTEN HAS NO CHOICE BUT TO MEET THE CONTRACTOR'S PRICE.

THE FOLLOWING ARE RECENT EXAMPLES FROM MY OWN EXPERIENCE:

ONE LARGE CORPORATION HAS A VIRTUAL MONOPOLY ON NICKEL PRODUCTS IN THE UNITED STATES. OFTEN THE ONLY COMPETITION FOR NICKEL ALLOYS IS BETWEEN THAT FIRM AND ITS OWN LICENSEES. RECENTLY THE NAVY PROPOSED TO CONTRACT WITH THIS COMPANY FOR SOME DEVELOPMENTAL MATERIAL FOR POSSIBLE APPLICATION IN FUTURE SHIPS. THE NAVY CONTRACTING OFFICER HAS DETERMINED THAT UNDER THE TRUTH-IN-NEGOTIATIONS ACT THE

COMPANY IS REQUIRED TO SUBMIT COST OR PRICING DATA IN SUPPORT OF THE PROPOSED PRICE, OR TO SUBMIT DATA TO DEMONSTRATE THAT THIS PROCUREMENT QUALIFIES FOR AN EXEMPTION AS COMMERCIAL ITEMS SOLD IN SUBSTANTIAL QUANTITIES TO THE GENERAL PUBLIC. THE COMPANY, WHICH IS HEADED BY A FORMER ASSISTANT SECRETARY OF THE NAVY, REFUSES TO GIVE THE GOVERNMENT ITS COST BREAKDOWNS AS A MATTER OF POLICY, AND READILY ADMITS IT HAS NOT PROVIDED COST DATA TO THE GOVERNMENT SINCE ENACTMENT OF THE TRUTH-IN-NEGOTIATIONS ACT ALMOST 20 YEARS AGO. IN AN EFFORT TO AVOID DISCLOSING ITS COST AND PROFIT FIGURES, THE COMPANY NOW PROPOSES TO PERFORM ONLY PART OF THE WORKSCOPE AND PROVIDE DATA WHICH THE FIRM CONTENDS WILL SUBSTANTIATE AN EXEMPTION FOR THAT PART OF THE WORK.

WITHOUT PREJUDGING THE COMPANY'S SUBMITTAL, THIS IS AN EXAMPLE OF AN ESSENTIAL SUPPLIER WHO REFUSES TO DISCLOSE THE PROFITS HE MAKES ON DEFENSE CONTRACTS. OTHER MATERIAL SUPPLIERS, COMPUTER MANUFACTURERS, PETROLEUM PRODUCERS AND OTHER INDUSTRIES UPON WHICH THE GOVERNMENT DEPENDS FOR DEFENSE NEEDS ALSO REFUSE TO PROVIDE COST DATA. IN THESE CASES GOVERNMENT CONTRACTING OFFICERS, IN ORDER TO GET THE MATERIALS THEY NEED, TEND TO LOOK FOR LOOPHOLES IN THE LAW AND WAYS TO RATIONALIZE HOW THEY CAN AWARD THE CONTRACT WITHOUT GETTING THE COST DATA. THIS HIGHLIGHTS THE NEED FOR THE GOVERNMENT TO BE ABLE TO SCREEN FOR AND RECOUP EXCESSIVE PROFITS.

IN ANOTHER SITUATION ARISING ONLY LAST WEEK, A SHIPYARD UPON WHICH THE NAVY HAS DEPENDED FOR SHIP DESIGN WORK, DEMANDED A 38 PERCENT INCREASE IN THE PROFIT RATE PREVIOUSLY ACCEPTED FOR THIS TYPE OF WORK ON A SMALL COST REIMBURSEMENT TYPE DESIGN CONTRACT. EXTENSIVE NEGOTIATIONS FAILED TO GET THE PROFIT REDUCED TO THE HISTORICAL RATE. THE COMPANY IN EFFECT HAS CONFRONTED THE GOVERNMENT WITH A TAKE-IT-OR-LEAVE-IT PROPOSITION.

Another case involves shipbuilding contracts the Navy is now negotiating for nuclear submarines authorized by Congress in the FY 1980 shipbuilding program. The Navy is currently trying to include provisions in shipbuilding contracts which would require the contractor to identify potential contract changes promptly so that they can be resolved as they occur. These provisions are designed to preclude submission of large omnibus claims years after the fact - the sort of claims that have plagued the Navy during the past decade. Although some shipbuilder officials profess to share the Navy's desire to keep contracts current and on a pay-as-you-go basis, they at the same time insist on loopholes which would preserve their ability to assert claims years after the fact. By refusing to agree to provisions which ensure that contracts can be kept current, some shipbuilders apparently believe they can avoid this Committee's mandate that Navy shipbuilding contracts are to be administered on a pay-as-you-go basis.

In another procurement, a large component supplier insists that future contracts must provide for a 35% return on investment in order to meet corporate profit objectives, or they will no longer supply defense equipment. This is a far better return than ordinary citizens realize on their savings. In this case because we have alternative suppliers, the threat of this supplier leaving the business is not a problem. However, the incident highlights the levels of financial return some defense contractors consider the Government owes them and the weakness of the Government in sole-source situations. It also highlights the need for an after-the-fact review of actual defense profits.

In Defense procurement, competition does not provide adequate

ASSURANCE AGAINST EXCESSIVE PROFITS. IT IS EASILY POSSIBLE FOR DEFENSE CONTRACTORS TO REALIZE EXCESSIVE PROFITS DESPITE FULL COMPLIANCE WITH DEFENSE PROCUREMENT RULES AND REGULATIONS, GOVERNMENT AUDITS, AND OTHER SAFEGUARDS THAT ARE APPLIED AT THE FRONT END OF THE PROCUREMENT PROCESS.

CONGRESS ENACTED PROFIT LIMITING LEGISLATION AND OTHER SAFEGUARDS IN RESPONSE TO WELL PUBLICIZED CASES OF CONTRACTOR EXCESSES. IN RECENT YEARS, THESE SAFEGUARDS HAVE BEEN WATERED DOWN OR ELIMINATED. WERE CONGRESS TO EXCUSE CONTRACTORS FROM VINSON-TRAMMELL FOR THE PERIOD IN QUESTION, SOME $200 BILLION OF DEFENSE CONTRACTS WOULD ESCAPE REVIEW. THIS IS IN ADDITION TO THE $150 BILLION BACKLOG THAT ESCAPED REVIEW WHEN THE RENEGOTIATION BOARD WAS ABOLISHED.

THE VINSON-TRAMMELL ACT HAS ITS SHORTCOMINGS. IT SHOULD APPLY TO ALL TYPES OF DEFENSE CONTRACTS, NOT JUST AIRCRAFT AND SHIPS, AND PERMIT CONSIDERATION OF FACTORS OTHER THAN SIMPLY PROFIT AS A PERCENTAGE OF COST IN EVALUATING THE REASONABLENESS OF INCURRED PROFIT. PERHAPS CONGRESS WOULD WANT TO EXEMPT SOME SMALL BUSINESSES. BUT THESE SHORTCOMINGS ARE NO REASON TO EXEMPT ALL CONTRACTORS FROM THE VINSON-TRAMMELL ACT.

I DO NOT CONTEND THAT THE MAJORITY OF DEFENSE CONTRACTORS ARE PROFITEERS. EXCESSIVE PROFITS ARE NOT NECESSARILY THE RESULT OF DECEPTION OR DELIBERATE OVERPRICING. UNEXPECTED CHANGES IN VOLUME OF BUSINESS, UNANTICIPATED TECHNOLOGICAL ADVANCES IN THE INDUSTRY, A SHARP CHANGE IN ECONOMIC CONDITIONS OR HONEST ERRORS, CAN ALL LEAD TO EXCESSIVE PROFITS DESPITE COMPLIANCE WITH ALL EXISTING PROCUREMENT REGULATIONS, INCLUDING PREAWARD REVIEW OF CONTRACTOR PROPOSALS BY GOVERNMENT AUDIT. BUT, THE NOTION PUT FORTH BY DEFENSE LOBBYISTS THAT DEFENSE CONTRACTORS CAN BE RELIED UPON TO EXERCISE SELF-RESTRAINT IN THEIR PRICING OF GOVERNMENT CONTRACTS

IS UNREALISTIC.

IT IS IN THE INTEREST OF THE INDIVIDUAL DEFENSE CONTRACTORS AS WELL AS THE PUBLIC TO ASSURE THAT FIRMS WHICH REALIZE EXCESSIVE PROFITS HAVE TO REFUND THEM. THE AMERICAN TAXPAYER EXPECTS AND DESERVES PROPER ACCOUNTABILITY IN THE EXPENDITURE OF PUBLIC FUNDS. IT IS UP TO CONGRESS TO INSURE THAT THE BILLIONS OF TAX DOLLARS SPENT ON NATIONAL DEFENSE DO NOT INCLUDE EXCESSIVE PROFITS.

FOR THIS REASON, I URGE THAT THE COMMITTEE NOT ENDORSE HR 7247 NOR AGREE IN CONFERENCE TO SIMILAR PROVISIONS PROPOSED IN THE SENATE VERSION OF THE FY 1981 DEFENSE AUTHORIZATION ACT.

AND FINALLY I WOULD REMIND YOU WHAT IS STATED IN THE GOSPEL OF MATTHEW: "WHERE YOUR TREASURE IS, THERE YOUR HEART BE ALSO". WE KNOW FOR WHAT THE HEARTS OF SOME DEFENSE CONTRACTORS BEAT - BUT THE HEART OF OUR CITIZENS AND LAWMAKERS BEAT FOR A NOBLER PURPOSE.

THIS STATEMENT REFLECTS THE VIEWS OF
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
THE NAVY OR THE DEPARTMENT OF THE NAVY

STATEMENT OF
ADMIRAL H. G. RICKOVER, USN
BEFORE THE
SUBCOMMITTEE ON PROCUREMENT & MILITARY NUCLEAR SYSTEMS
OF THE
COMMITTEE ON ARMED SERVICES
UNITED STATES HOUSE OF REPRESENTATIVES

JUNE 16, 1981

CONGRESS HISTORICALLY HAS ENDORSED THE PRINCIPLE THAT CONTRACTORS SHOULD NOT BE ALLOWED TO REALIZE EXCESSIVE PROFITS ON DEFENSE CONTRACTS. WITH AN EXPANDING DEFENSE PROGRAM, IT IS IMPORTANT THAT CONGRESS NOT RETREAT FROM THIS FUNDAMENTAL PRINCIPLE.

FROM 1942 THROUGH 1976 A RENEGOTIATION ACT OF ONE FORM OR ANOTHER SUSPENDED THE PROFIT LIMITING FEATURES OF THE VINSON-TRAMMELL ACT. UNDER THE RENEGOTIATION ACT FACTORS SUCH AS CONTRACTOR EFFICIENCY AND INVESTMENT IN FACILITIES WERE TO BE CONSIDERED IN DETERMINING EXCESS PROFITS. WITH THE DEMISE OF THE RENEGOTIATION BOARD, THE VINSON-TRAMMELL ACT OF 1934 CAME INTO EFFECT. THIS LIMITS PROFITS TO 10 PERCENT OF THE CONTRACT PRICE FOR SHIPS, AND TO 12 PERCENT OF THE CONTRACT PRICE FOR AIRCRAFT. OTHER WEAPONS AND SUPPLIES ARE NOT COVERED BY THE VINSON-TRAMMELL ACT.

Contrary to what defense contractor lobbyists would have you believe, existing procurement safeguards do not preclude excessive profits on defense contracts. Defense contractor lobbyists often cite competition and procurement safeguards such as the Truth In Negotiations Act and the Cost Accounting Standards as obviating the need for profit limiting legislation.

Competition in defense procurement is often more illusory than real. While 35 percent of the defense procurement budget is spent under contracts the Defense Department considers competitive, only about 8 percent is spent on formally advertised procurements - that is where any company may submit a bid and the contract must be awarded to the lowest responsive and responsible bidder. In some competitive procurements only two or three firms are asked to bid. In other so-called competitive procurements the competition is not based on price, but on design or other technical factors. Sixty-five percent of the defense procurement budget is awarded in contracts which the Defense Department itself labels as non-competitive.

The Truth In Negotiations Act is sometimes cited as a safeguard against excessive profits. It requires contractors to disclose the data they themselves use in preparing their price in non-competitive procurements. But that law is often circumvented. Some contractors simply refuse to provide the required data. Others claim exemptions based on loopholes in the law. And even when cost and pricing data is provided, neither the Truth In Negotiations Act nor any other act or regulation precludes contractors from

INFLATING THEIR COST ESTIMATES OR SIMPLY DEMANDING EXCESSIVE PROFITS. OFTEN CONTRACTORS CAN ADOPT A "TAKE-IT-OR-LEAVE-IT" ATTITUDE IN DEALING WITH THE DEFENSE DEPARTMENT AND EFFECTIVELY DICTATE PRICE AND TERMS.

CONGRESS ESTABLISHED THE COST ACCOUNTING STANDARDS BOARD TO SET STANDARDS TO HELP REDUCE ACCOUNTING ABUSES IN THE DEFENSE INDUSTRY. DEFENSE CONTRACTOR LOBBYISTS POINT TO THESE STANDARDS AS ANOTHER REASON WHY PROFIT LIMITING LEGISLATION IS NOT NEEDED. HOWEVER, THESE STANDARDS DO NOT DEAL WITH THE ISSUE OF HOW MUCH PROFIT A COMPANY SHOULD BE ALLOWED.

THE LOBBYISTS OFTEN CITE INDUSTRY-WIDE AVERAGE PROFIT FIGURES TO JUSTIFY THEIR CONTENTION THAT DEFENSE PROFITS ARE NOT EXCESSIVE, AND THEREFORE PROFIT LIMITING LEGISLATION IS UNNECESSARY. THIS IS LIKE USING AVERAGE DEPTH FIGURES TO PROVE THAT THERE ARE NO DEEP SPOTS IN A RIVER.

I DO NOT CONTEND THAT ALL, OR EVEN A MAJORITY OF DEFENSE CONTRACTORS ARE MAKING EXCESSIVE PROFITS. LIKEWISE, NEITHER ARE THE MAJORITY OF OUR CITIZENS CRIMINALS. BUT, TO PROTECT AGAINST THE EXCEPTIONS WE NEED POLICE IN THE CASE OF CRIMINALS AND PROFIT LIMITATIONS IN THE CASE OF DEFENSE CONTRACTORS.

SOME BELIEVE THAT ALL DEFENSE CONTRACTORS CAN BE COUNTED UPON TO EXERCISE SELF RESTRAINT. HERE ARE EXAMPLES TO THE CONTRARY:

1. ONE SOLE SOURCE CONTRACTOR TYPICALLY NEGOTIATES A TARGET PROFIT EQUAL TO 10 PERCENT OF THE ESTIMATED COST OF THE WORK. THE WORK IS DONE UNDER RISK-FREE, COST PLUS-INCENTIVE FEE CONTRACTS. AFTER THE CONTRACT IS COMPLETED AND ALL CHANGES HAVE

BEEN NEGOTIATED, HE ENDS UP MAKING, ON THE AVERAGE, A 17-1/2 PERCENT PROFIT ON HIS ACTUAL INCURRED COSTS.

2. ONE CONTRACTOR HAS MADE PROFITS AS HIGH AS 36 PERCENT ON SOME FIRM FIXED PRICE CONTRACTS FOR SHIP REPAIR WORK. THE CONTRACTOR HAS AVERAGED A 21 PERCENT PROFIT ON THESE CONTRACTS, EVEN THOUGH HIS RISK HAS BEEN NEGLIGIBLE.

3. A COMPANY THAT MANUFACTURES HIGH PRESSURE AIR FLASKS FOR TRIDENT SUBMARINES INSISTED ON A PROFIT BETWEEN 27 AND 38 PERCENT OF ESTIMATED COST.

4. A SOLE SOURCE SUPPLIER OF SPECIAL MATERIAL USED IN NUCLEAR PROPULSION PLANTS DEMANDS A PROFIT OF 25 PERCENT OF HIS ESTIMATED COST.

5. A SOLE SOURCE SUPPLIER OF SPECIAL MATERIAL USED FOR LARGE VALVES IN NUCLEAR POWERED SHIPS INITIALLY REFUSED TO SUBMIT THE COST AND PRICING DATA REQUIRED BY LAW IN THE TRUTH IN NEGOTIATIONS ACT. THE ORDER WAS PLACED CONTINGENT UPON HIS AGREEMENT TO PROVIDE THIS DATA. AFTER THE CONTRACT AWARD, THE COMPANY SUBMITTED COST DATA WHICH SHOWED A 66 PERCENT PROFIT IN HIS PRICE.

ALTHOUGH THE DEFENSE DEPARTMENT EVALUATES AND NEGOTIATES PROFITS AS A PERCENTAGE OF COST, WE CANNOT ALWAYS TELL WHETHER OR NOT EXCESSIVE PROFITS EXIST JUST BY LOOKING AT CONTRACTOR PROFIT EXPRESSED AS A PERCENTAGE OF COST. IF THE DOLLARS HE INVESTED ARE SMALL IN RELATION TO HIS PROFIT, RETURN ON HIS INVESTMENT WILL NATURALLY BE HIGH. FOR THIS REASON, WHEN A CONTRACTOR HAS HIGH COSTS AND SMALL INVESTMENT, FIVE PERCENT PROFIT ON COST CAN BE VERY LUCRATIVE. ALTERNATIVELY, A PROFIT OF 12 PERCENT OF

COST MIGHT BE MODEST ON A CONTRACT WHICH INVOLVES LARGE INVESTMENT AND LITTLE SUBCONTRACTING.

UNDER THE RENEGOTIATION ACT, MANY FACTORS INCLUDING RETURN ON INVESTMENT, RISK, NATURE OF THE BUSINESS, AND CONTRIBUTION TO THE DEFENSE EFFORT WERE TAKEN INTO ACCOUNT BEFORE THE DETERMINATION OF EXCESS PROFIT COULD BE MADE. THIS IS WHY THE RENEGOTIATION ACT WAS A MORE EQUITABLE AND FAR BETTER APPROACH TO PROFIT LIMITING LEGISLATION THAN THAT SPECIFIED IN THE VINSON-TRAMMELL ACT.

VARIOUS ALTERNATIVES TO THE RENEGOTIATION AND VINSON-TRAMMELL ACTS HAVE BEEN PROPOSED FROM TIME TO TIME TO PREVENT CONTRACTORS FROM MAKING EXCESSIVE PROFITS ON DEFENSE CONTRACTS. REGARDLESS OF THE METHOD SELECTED, EFFECTIVE PROFIT LIMITING LEGISLATION SHOULD PROVIDE FOR THE FOLLOWING:

1. IT SHOULD APPLY TO ALL TYPES OF DEFENSE WORK, NOT JUST AIRCRAFT AND SHIPBUILDING. SOUND PUBLIC POLICY AND EQUITY TO THE TAXPAYERS REQUIRE RECOVERY OF EXCESSIVE PROFITS, REGARDLESS OF THE TYPE OF EQUIPMENT.

2. PROFIT LIMITATIONS SHOULD COVER SUBCONTRACTS AS WELL AS PRIME CONTRACTS. THERE IS LITTLE SURVEILLANCE OF PROFIT AT THE SUBCONTRACT LEVEL, AND HERE IS WHERE THE GREATEST POTENTIAL FOR ABUSE EXISTS. SOLE SOURCE PRIME CONTRACTORS HAVE LITTLE, IF ANY, INCENTIVE TO HOLD DOWN SUBCONTRACT COSTS. SINCE THE PROFITS IN NEGOTIATED PROCUREMENTS ARE FIGURED AS A PERCENTAGE OF COST, PRIME CONTRACTORS MAKE MORE PROFIT WHEN THEIR SUBCONTRACT MATERIAL QUOTES ARE HIGH.

3. Profit limits should apply in peace as well as in war. I see no logic in making a distinction when the taxpayer must pay the bill.

4. Exemptions for competitive contracts should apply only when the contract is awarded after formal advertising. The limited competition available when only a few firms are able to perform the work is not sufficient to stop excessive profits.

5. Provisions for limiting profits should be included in each defense contract and subcontract valued at more than $500,000. This will avoid situations in which a contractor can hide excess profits by averaging them with the profits on less profitable contracts or on his commercial business.

6. In determining excessive profits the law should provide for consideration of the statutory factors specified in the Renegotiation Act. In this way return on investment, production efficiency, and other matters which affect the determination of excessive profits can be considered.

7. If Congress decides that, for purpose of simplification, a more mechanical approach to determining excessive profits should be established, the General Accounting Office should be tasked to develop formulae to determine excess profits, taking into account industry wide profit averages and return on investment.

8. Another approach would be to require the Department of Defense to recommend a profit limit as a percentage of cost, or as a rate of return on investment. This should be done annually as part of the budget submitted to Congress. In this way Congress

WILL BE ABLE TO DETERMINE WHAT PROFIT LIMITS SHOULD APPLY TO THE GOODS AND SERVICES FOR WHICH THE FUNDS WERE APPROPRIATED.

WE ALL KNOW WHAT THE DEFENSE CONTRACTOR LOBBYISTS HAVE BEEN TRYING TO ACHIEVE. IN THE 1960'S THEY WORKED TO BLOCK ESTABLISHMENT OF THE COST ACCOUNTING STANDARDS BOARD ON THE BASIS THAT THE RENEGOTIATION BOARD ADEQUATELY PROTECTED THE PUBLIC AGAINST EXCESSIVE PROFITS. THEN, AFTER CONGRESS ESTABLISHED THE COST ACCOUNTING STANDARDS BOARD, THEY LOBBIED TO ABOLISH THE RENEGOTIATION BOARD, CITING THE COST ACCOUNTING STANDARDS BOARD AS THE SAFEGUARD THAT MADE RENEGOTIATION UNNECESSARY.

AGAIN, WHEN THE RENEGOTIATION BOARD WENT OUT OF EXISTENCE, THEY SET THEIR SIGHTS ON ABOLISHING THE COST ACCOUNTING STANDARDS BOARD, OR AT LEAST TRANSFERRING IT TO THE EXECUTIVE BRANCH, WHERE THEY WOULD HAVE A BETTER CHANCE TO WATER DOWN THE STANDARDS.

TODAY BOTH THE RENEGOTIATION BOARD AND THE COST ACCOUNTING STANDARDS BOARD ARE OUT OF BUSINESS. THE NEXT OBJECTIVE APPARENTLY IS TO ELIMINATE THE SOLE REMAINING FORM OF PROFIT LIMITING LEGISLATION, THE VINSON-TRAMMELL ACT AND BLOCK EFFORTS TO REPLACE IT WITH A MORE EFFECTIVE SUBSTITUTE.

HISTORY SHOWS THAT BY NO MEANS CAN WE ASSUME THAT ALL GOVERNMENT CONTRACTORS CAN BE COUNTED UPON TO EXERCISE SELF RESTRAINT, PARTICULARLY IN DEALING WITH THE GOVERNMENT. FURTHER, MANY GOVERNMENT OFFICIALS WHO SPEND OUR MONEY CONSIDER IT LIKE "STAGE MONEY". THE SUMS ARE SO LARGE COMPARED WITH THEIR PERSONAL SPENDING THAT THEY ARE NOT CAPABLE OF UNDERSTANDING THAT THEY ARE OBLIGATING EACH OF OUR 220 MILLION CITIZENS. IT IS FOR THIS

REASON THAT CONGRESS NEEDS TO ESTABLISH AN EFFECTIVE MEANS TO RECOUP FOR THE U.S. TAXPAYER ANY EXCESSIVE PROFITS ON DEFENSE CONTRACTS.

THIS SPEECH REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

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BUSINESS AND FREEDOM

by
Admiral H. G. Rickover, U.S. Navy
at the
Economic Club of Indianapolis, Inc.
Indianapolis, Indiana
Friday, November 7, 1975

Over a period of many years I have spoken and written about such issues as education, freedom, science, engineering, and technology—all of concern to many Americans.

But since this audience is especially interested in business and economics, I thought I would share with you some of my thoughts on these, based on my experience in dealing with many segments of American industry for more than 35 years. Part of my work has involved the procurement from private business organizations of billions of dollars worth of machinery, electrical equipment, and nuclear components for ship propulsion and for civilian power plants.

This experience, combined with a lifelong interest in government, philosophy, and history have given me a unique vantage point to observe many aspects of business conduct.

I feel especially indebted to our country for the opportunities it has given me—education, a profession, observing other cultures, and a variety of experiences. In every respect America has been good to me.

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I am deeply concerned, however, that the opportunities we have had in the past may not exist in the future. As a nation, we are burdened by internal problems unparalleled since the Civil War: the energy crisis, the threat to the environment, the problems of the cities, the abuse of and consequent loss of respect for traditional institutions and values.

Compounding these problems and exacerbating them is a condition of increasing moral decay which seems to be spreading throughout our society. This exists in many areas, but I will focus on business, and the state of business ethics.

Although I shall be critical of certain business practices, I am not hostile to business, to free enterprise, or to capitalism. I believe in the capitalist system. No other system offers as much opportunity for individual freedom. I criticize only because I do not want to see this system destroyed.

Business is an essential part of society. Throughout history, societies have recognized its importance and have established standards for its conduct. The code of Hammurabi 4000 years ago governed contracts, loans, debts, deposits, and other areas of commerce in ancient Babylon. The Old Testament forbade stealing—one of the Ten Commandments—also bribery, short measure, false dealing, lying, fraud. During the Middle Ages, the Church prohibited usury. From the Protestant Reformation emerged the idea of business as a Godly calling in which the businessman conducted his affairs as a public service, of benefit to himself and to his neighbors. From the earliest days of recorded history man has struggled to reconcile the pursuit of profit with honest dealing and useful service, to balance self-interest with the common good.

Because of industrialization and urbanization, the effect of business on society is now greater than it ever was. A half century ago Calvin Coolidge said: "The business of America is business." Its influence is no less pervasive today. Our society honors those who excel in business. Labor leaders, doctors, lawyers, accountants, engineers emulate them. Business leaders, as much as anyone, set the moral tone of society.

Yet the image business leaders convey has not always been flattering. In 1912, Charles Francis Adams, Jr., descendant of two Presidents, said of business in the United States: "I have known, and known tolerably well, a good many 'successful' men—'big' financially—men famous during the last half-century; and a less interesting crowd I do not care to encounter. . . A set of mere money getters and traders, they were essentially unattractive and uninteresting. . ." This quotation from Adams is as important as that from Coolidge, for Adams warns that business leaders may lack the vision to see their obligation to the society which nourishes them.

What example are businessmen setting today? Can you remember a single week in recent months when the press was not filled with accounts of business wrongdoing? Here are a few recent ones: 19 companies convicted of making illegal political contributions; the fertilizer industry investigated for price-fixing and other anti-trust violations; a well-known ice cream manufacturer indicted on charges of knowingly marketing tainted ice cream; a major oil company making unlawful payments to foreign officials; six securities firms disciplined for stock manipulation; prominent bankers indicted for unauthorized speculation in foreign currencies; a leading truck manufacturer found guilty of conspiring to evade taxes.

In the area of defense contracting where I have first hand experience, the problems are similar. The Justice Department is investigating the possibility of fraud in contract claims; Congress held hearings on the refusal of one of America's largest corporations to comply with Defense procurement regulations; some contractors have refused to honor Government contracts; there were charges of conflict of interest involving former military officers working for defense contractors.

Because unlawful actions are more newsworthy than lawful ones, one might contend that news accounts are not an accurate measure of the prevailing moral climate in American business. On the other hand, unethical, though not illegal conduct often goes unreported. I have observed such unethical practices first-hand: use of deceptive accounting techniques, refusal to honor contracts, attempts to subvert laws and regulations. Such practices are commonplace; I doubt they are confined to the defense industry.

The business community has evidenced little concern about transgressions within its ranks. Criticism of business conduct typically comes from outside. Even ethical businessmen appear to feel no obligation to speak out against less scrupulous colleagues. Nor is this silence broken by so-called experts in ethics. A recent survey of theologians and professors of business ethics about bribery and political meddling overseas by American corporations resulted in inconclusive answers. One professor called foreign bribery a "semantic" rather than an ethical problem. Some prominent clergymen with close ties to business declined to comment at all.

But the public is not indifferent. Another recent poll reported that eighty-two percent of the American people believe that, if left alone, big corporations will be greedy and selfish and make profits at the expense of the public. Proliferation of consumer interest groups confirms this growing public concern.

Too often business has reacted to public criticism with more and larger public relations campaigns. Companies contend they have been misunderstood; they emphasize the benefits they claim to be providing the public, stockholders, employees, customers and to the free enterprise system. Press releases and advertisements portray businessmen as rugged individualists who believe in free markets, price competition, and concern for our society. Unfortunately, too few of them act in accordance with these high ideals.

Some argue that illegal or unethical practices which do come to light are not typical; that the ones who survive in the marketplace are ethical; that those who fail to meet minimum ethical standards lose out in our competitive system. This is the classic concept of the self-regulating economy articulated by Adam Smith 200 years ago. Unfortunately, in our modern economy, buyers and sellers are seldom equal; competiiion frequently is not adequate to insure ethical conduct.

Many businessmen are, of course, ethical. Many firms, particularly small ones, act in the finest tradition of the free enterprise system. A typical example of how the small company operates is one that has an important contract for my program. Its outlook is refreshing. Its owners do not spend nearly all of their time, as do the officials of large companies,on public relations, lobbying, and exerting political influence. Instead, they understand it is up to them to please the customer and make a success of the work. This they do by paying close attention to the work itself. When confronted with problems, they do not seek bail-outs or subsidies or use influence in high places to get special privileges.

I have found that small and medium size companies take a more responsible view toward their contractual obligations than the large ones. One reason for this is that market forces generally are more effective in restraining their behavior. They are also better able to perform a back-up role of providing new and alternative products when larger firms fail to do so.

I have also observed that larger firms expect to be insulated from risk of business failure. When a small firm becomes inefficient or otherwise unable to compete, it fails. But many large companies act as if the Government has an obligation to protect them from failure. And within Government, there are policy makers who are loathe to allow large firms to fail because much is at stake for the owners, customers, employees and creditors.

I disagree with this point of view. Rather, I agree with the sentiments expressed by Mr. Donald T. Regan, chairman of one of the largest and most prominent Wall Street brokerage houses. Here is what he said of stockbrokers who faced financial ruin: "So what if they go bust? What God-given right do they have to stay in business? That is what the country and capitalism are supposed to be all about." If we gave the matter adequate thought, we would realize that we are really protecting the managers who have been responsible for the failure. The facilities and actual working people are still there and in many cases could continue to produce under different ownership or management.

Another way large companies have tried to escape the workings of the self-regulating economy is to produce what they want to sell, rather than what the consumer needs to buy. Sale of these products is induced through skillful advertising, and the price set without regard to demand. Large conglomerate and multinational corporations are particularly effective in avoiding market forces because of their size, diversity, and ability to muster great financial resources to pay for advertising, public relations and lobbying.

Large corporations are often able to escape the traditional safeguards of the marketplace. This is especially disturbing because of their ever-increasing accumulation of economic power. One hundred corporations control over 50 percent of our entire industrial output. Four corporations, in their respective industries, control over 99 percent of vehicle output, 90 percent of aluminum fabrication, 80 percent of cigarette production, and 72 percent of the detergent market.

Often the largest businesses—those not subject to most of the restraints of free enterprise—are the most outspoken advocates of the capitalist, free enterprise system as an effective safeguard against business excesses. They want the public to believe that the free enterprise system regulates their behavior, when in fact they are escaping the restraints of that system. Time and again, they lobby against new Government regulations, and herald the virtues of competition and the marketplace as if they were small businessmen subject to these forces. Simultaneously, they lobby for assistance in the form of tax loopholes, protected markets, subsidies, guaranteed loans, contract bailouts, and so on. They take no chances; they light one candle for Christ and one for the devil.

Apparently, they want subsidized free enterprise or capitalism with a guaranteed return—a contradiction in terms. So long as they make profit, they want the benefits of the free enterprise system. Once profits turn to losses, they look to Government for help.

Freedom is not a license to avoid responsibility. If men expect to reap the benefits of our system, they should be willing to accept its responsibilities and risks.

Many in the United States are troubled by the pervasive influence of big business on our economy. Reinhold Niebuhr, the theologian, observed that the imposition of ethical standards on large organizations is one of the major problems of our time. Ordinary citizens, and some national leaders recognize this problem.

Some perceive the solution in the classic concept of a self-regulating, free market economy, free of all, or nearly all Government regulation and control. Others advocate an economy regulated and controlled in large part by Government.

I subscribe to neither of these views. As a student of history, I do not believe that free market forces automatically restrain excesses of the profit motive or impose a standard of ethical conduct on big business. It is questionable whether market forces ever were truly effective in restraining their conduct. When there was an essentially free market in this country—during the late 19th century before antitrust legislation and during the laissez-faire period of the 1920's—

there was much business misconduct. Those were the days of the Robber Barons and manipulated stock prices. The free market of those periods failed to restrain big business. The inevitable result was increased Government regulation, most of which had its origin in the abuse of the free market.

The factors which have made the free market ineffective—the rise of large corporations, the sheer size of our economy, the complexities of modern industrial production—will continue. Under these circumstances, a free market economy of small, autonomous businesses roughly equal in economic power, is a naive notion born of nostalgia for what never was.

By contending that the current marketplace can effectively regulate business conduct, businessmen unwittingly do a disservice to the capitalist system; they play into the hands of advocates of a strictly regulated economy. When market forces fail to regulate business conduct and wrongdoing results, public pressure for regulation mounts. In effect, those most committed to an unregulated capitalist system end up overwhelmed by regulation because the free market they advocate does not by itself exert sufficient restraint on their conduct.

At the other extreme are those who favor Government regulation and control. In their view, business cannot be trusted to keep its house in order. Their belief, to paraphrase Clemenceau, is that business is too important to be left entirely to businessmen. Their thesis is that capitalism can only result in a rich society, not a just one; therefore, it cannot or should not survive.

I do not support this view. I believe in capitalism and in competition. I believe that business has a right to pursue reasonable profit. I am convinced our capitalist system must survive in order for our fundamental freedoms to survive. In this respect, I am a conservative in the literal sense of that word, which means "to save," to respect established values.

The essence of our capitalist system is spontaneity and freedom of choice. Businessmen, at their own risk, may choose which products to produce, at what prices to offer them, from whom to buy materials. Entrepreneurs are free to try to fill perceived economic needs.

Contrast this with a system in which the economy is under complete state regulation and control. Industrial activity is planned by the state. There are no entrepreneurs as we know them. By and large, businessmen can not enter fields of their choice but are told by the bureaucracy what products to produce, at what price to sell them, from whom to buy.

The material well-being under our system can be traced to fundamental differences. In the United States there is a free business community in conflict with itself and with Government regulation and control. From this conflict and tension comes progress. In the state-controlled system conflict is minimized. But without conflict there is little criticism and without criticism, there is less chance for progress.

More important than material well-being is the degree of individual freedom under the two systems. Because economic and business activity is central to a modern society, the form of economic organization has a great impact on freedom. This is particularly important for freedom in large, industrialized nations. Communism and socialism generally give lip service to individual liberty, but do not always practice it. State control places a premium on material well-being at the expense of freedom. Some visitors to communist and fascist countries have praised what they see, pointing to clean streets and the absence of stray dogs. Many do not note also the absence of freedom in the streets. It is a striking coincidence of history that all utopias, from the Guardians of Sparta onward, inevitably developed into some form of dictatorship.

Capitalism, based as it is on freedom of choice, helps preserve our other freedoms. For all its imperfections, it is the best system yet devised by man to foster a high level of economic well-being together with individual freedom. Should our capitalist system be destroyed, its destruction will be accompanied by the loss of most of our other liberties as well.

Let me summarize where I think we are: the classic concept of a self-regulating, free market economy in a complex modern society no longer enforces the required high standard of ethical business conduct. Those who advocate exclusive reliance on the market do disservice to capitalism, since the result often is increased Government intervention, the very antithesis of their goal. On the other hand, the destruction of capitalism and the establishment of complete state control are inimical to economic and political freedom.

I advocate a middle ground between these two extremes. I am concerned with the survival of our capitalist system. Here are some steps I believe should be taken to preserve it.

First, I believe that businessmen must treat Government regulation realistically rather than with instinctive opposition as well as manipulation through public relations and political influence. Much of Government regulation is necessary to protect the public against the recurrence of past abuses, and because it is unrealistic to expect any group to truly police itself. Businessmen should face the fact that regulation is inevitable. Blind opposition to all regulation detracts from the valid complaints business may have about the excesses of regulation.

But they undermine public confidence in their integrity when, to protect themselves from normal market forces they publicly oppose regulation while privately exploiting the regulatory process. For example, according to the Chairman of the Federal Trade Commission, the Civil Aeronautics Board has, by controlling the entry of new airlines into the air transportation market, eliminated all competition in air routes and rates. When the Administration recently proposed reducing economic controls on the domestic airline industry, the chief executive of a major airline opposed this move. It is obvious the airlines oppose deregulation.

Second, I believe businessmen must vigorously advocate respect for law. Law is the foundation of our society. Few areas of society are as dependent upon law as is business. It is law that protects such essential rights of business as integrity of contracts. When businessmen break the law, ignore its spirit, or use its absence to justify unethical conduct, they undermine business itself as well as their own welfare.

They should be concerned with the poor record of law enforcement as it relates to them, and be willing to reexamine an idea if an intellectually responsible attack is made against it. They should be concerned about the double standard where an ordinary citizen is punished more severely for a petty crime than corporate officials convicted of white collar crimes involving millions of dollars. In the recent cases of illegal corporate campaign contributions, only two of 21 executives convicted of violating the law received jail sentences. Most continued in their high level jobs or stayed on as highly paid consultants. Corporate fines averaged $5,000 and individual fines less than $2,000. The lightness of these penalties should be of concern. Some may take comfort in the traditionally light sentences imposed for white collar crime. But the more thoughtful should recognize it is not to their advantage to operate in an environment where those who violate or skirt the law make out better than those who respect and honor it, in letter and spirit.

They should take note of the recent Supreme Court decision in the Parks case. This decision may herald a new era of individual accountability for businessmen if its logic is applied widely by legislative bodies and courts. In that case, the Supreme Court ruled that corporate officials as individuals may be liable for the illegal acts of their companies. The Court said: "The only way in which a corporation can act is through the individuals who act on its behalf."

The Parks decision may balance the 1886 decision of the Court in the case of Santa Clara County vs. Southern Pacific Railroad in which the Court held that the Fourteenth Amendment applied to corporations. The Santa Clara decision thus gave corporations the same rights of protection as a "natural person." Although corporations had now won the rights of persons, the officials acting in their behalf were not held to the obligations required of persons. Instead, they were able to disclaim personal responsibility and shift the blame for their illegal acts onto the corporation.

I have long held the view that if a corporation is to be considered a person for purposes of protection under the Fourteenth Amendment, then all the obligations incumbent on a person ought to be binding on the corporation. And, since the corporation acts through its officials, they should be held personally liable for illegal corporate acts. The Parks case appears to be a step in this direction.

Although I have been speaking of compliance with the law, there is more to respect for law than merely observing its letter. No law, however strong, will suffice if men lack the inner will to act legally. Each of us is his own lawmaker; he is daily making decisions of right and wrong. If we break our personal laws of morality and integrity, then statutory laws can have no meaning for us.

Respect for law and realistic treatment of regulation are important steps that can be taken to preserve our system. But these steps involve accommodation to external forces and, as such, will never be wholly effective. External constraints such as law or regulation cannot entirely overcome man's inner motivations. Man has free will. Because of this, a third step is necessary—a moral approach that must begin by taking a hard look at ourselves.

This should start with the executives of large corporations—the ones most favored by capitalism. Many of them benefit from the system in which they risk little personally. They are given handsome salaries as well as other economic benefits. They are powerful and influential and have the most at stake in preserving our form of Government and our free society. They, above all, should be concerned with preserving our freedoms. This is best expressed in the Biblical injunction: "For unto whomsoever much is given, of him shall much be required."

Businessmen must do more than merely seek to preserve the freedom to make money. The unrestrained pursuit of profit is the heart of the problem; it cannot form a part of the solution. They should seek a higher purpose. They should restore ethical behavior to business practice.

In recent years there has been much talk about the need for businessmen to accept "social responsibility" and help solve critical national problems. Too often, however, they appear to conceive of social "projects" as substitutes for legal and moral practice. Often these projects are not substantive but only the familiar panoply of public relations, and the public has become skeptical of such gimmicks. They would be far more sympathetic if more businessmen demonstrated by their actions the determination to conduct their affairs ethically.

Businessmen need to exercise self-restraint. Capitalism in America should be practiced within a strict moral code. Morality benefits business, those who operate illegally or unethically threaten it. In failing to exercise self-restraint, they are stretching the rubber band until it is near breaking. If they so continue, they will inevitably be faced with being called "malefactors of great wealth" and having their large empires broken up as was done by Theodore Roosevelt. Many today see this as the basic way to remedy the excesses that pervade business. Besides this, there will also follow, as in the administrations of Woodrow Wilson and Franklin Roosevelt the establishment of powerful Regulatory Commissions to replace today's toothless ones.

Trust and good faith facilitate business. The underpinning of the capitalist system is to a large extent trust—the faith that men will deal fairly and honestly with the customer; with the general public; with each other; and with the stockholder.

There is another reason to adopt a strict code of moral and ethical conduct. As heirs to the ideas and accomplishments of all men who have ever lived, it is the responsibility of all of us to preserve a free society, where knowledge, truth and justice flourish, so that our inheritance can be passed on to posterity. Our responsibility involves dedication to an ideal higher than self. This means love of country and love of one's fellow man—present and future. It is marked by excellence, courage, honesty, selflessness, and many other terms which for millenia have represented the best traits of man.

Few would dispute that men should live morally and ethically according to these higher ideals. Why do we then not pursue this alternative? Primarily because it is the most difficult of all paths. Men have tried for thousands of years to be ethical and moral, with differing degrees of success. The duty to uphold the rights and interests of others often succumbs to selfishness. Then, when chaos threatens, many find it easier to accept the discipline of strict laws, regulations, and even curtailed freedoms than to exercise self-discipline. That is why, for a basic change to be made, it is necessary that men change their way of thinking. Change which is significant manifests itself more "in intellectual and moral conceptions than in material things." As difficult as this appears, such changes have occurred in the past.

The Hebrew concept of one God was one of these; it ultimately replaced the many gods of the pagan world.

The ancient Greeks adopted the attitude that reason must prevail among men and that the citizens themselves should govern.

The English Revolution of 1688 and the French Revolution of 1789 did away with the concept of divine right of monarchs; this led to greater democracy and freedom.

The ideas and works of Copernicus, Galileo, Kepler, Newton, and Darwin entirely changed man's concept of his place in the universe.

But men do not change their thinking overnight. For that reason we will continue to need laws and regulations to govern our personal lives and our business activities. I do believe, however, that individuals can change and can make a difference. People are eager for leaders who will give of themselves for the good of their communities. They are sick of platitudes, of high talking and low living, of fine words and selfish deeds. They want and will follow those who live by higher values.

Our Bicentennial should remind us that the leaders of our Revolutionary period showed that the individual can make a difference. These men, properly honored by the title "Founding Fathers," valued freedom and culture more than wealth. They brought fundamental honesty to the business of government, and dealt with their countrymen on frank and open terms. They lived by the ideals they propounded. The Declaration of Independence was no idle statement for them. In support of it they pledged, and some lost, their lives, their fortunes, and their sacred honor. Through their beliefs and individual deeds our Revolutionary leaders stirred their fellow countrymen to struggle and sacrifice for independence. More important, they set a moral tone and example for their age and ours.

To set an example, an individual starts with himself. He puts his family and his community above his own desires. He puts high moral and ethical principles into his personal and business dealings. He accepts as his personal responsibility the duty of restoring the concepts of honesty, truth and morality.

As a nation, we can choose one of two ways to bring about the changes needed in our country: we can use the power of the state or we can entrust the task to our capitalist system. In my opinion, to use the state will result—as it has in other parts of the world—in a loss of freedom. I believe the job can best be done by our capitalist system provided those who lead it understand that the methods used must be legal, must be supported by our government and people, and must transcend some of the current ways of conducting business. While capitalism must be based on the opportunity to make profit, those in charge must not use their special position to gain advantage over our country and our citizens.

The great problems facing us today—energy, population, the environment—demand the highest degree of ability and initiative. Solutions require basic changes in thinking and a willingness to question past practices. Although these problems are national in scope, the search for solutions can begin with day-to-day activities. For example, businessmen would be well advised to question their effect on our society by creating, through advertising, artificial demand for products of questionable value. They would also do well to consider the implications for the future of capitalism of a recent study which shows that misleading television advertising may permanently distort children's values of morality, society and business. And they should examine whether their practices exploit the fact, reported by another study, that 62% of adult Americans are rated either incompetent or barely competent on consumer economic questions.

Businessmen have a special opportunity and responsibility to effect beneficial change in our society. To do so they must set demanding goals for themselves. They should ask what will be their contribution to the legacy which American civilization leaves to the world? The

Hebrews endowed mankind with concepts of morality; the Ancient Greeks left concepts of democracy and self-government. The legacy of the Roman Empire was law.

It is my hope the American legacy will be more than a business structure whose major objective is attainment of wealth; more than a facility for self-serving public relations; more than a highly developed advertising industry with its propensity to "image-making." I hope America's legacy will be the accommodation of the forces of capitalism, democracy and morality in a highly industrialized society. Such a rich legacy would be worthy of a great nation.

THIS STATEMENT REFLECTS THE VIEWS BY
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
THE NAVY OR THE DEPARTMENT OF THE NAVY

OPENING REMARKS
OF
ADMIRAL H.G. RICKOVER
BEFORE
THE SENATE COMMITTEE ON THE JUDICIARY

MARCH 8, 1979

MERGER ACT OF 1979

MR. CHAIRMAN, THIS COMMITTEE WILL NO DOUBT HEAR FROM WITNESSES MORE QUALIFIED THAN I AM TO DISCUSS THE COMPLICATED ECONOMIC AND LEGAL THEORIES BEHIND CONGLOMERATION. SOME ECONOMISTS AND PROFESSORS HAVE MADE THIS THEIR LIFE WORK.

MY TESTIMONY IS FROM THE PERSPECTIVE OF A GOVERNMENT SERVANT WHO HAS CONDUCTED BUSINESS WITH DEFENSE CONTRACTORS FOR FORTY YEARS. IN THIS CAPACITY I HAVE WITNESSED AT FIRST HAND THE EMERGENCE OF THE LARGE CONGLOMERATES AND THEIR IMPACT ON THE COMPANIES THEY HAVE ACQUIRED.

BASED ON THIS EXPERIENCE, I CONCLUDE THAT MANY OF THE ADVANTAGES ATTRIBUTED TO CONGLOMERATES HAVE NOT MATERIALIZED. SPECIFICALLY, THE ADVENT OF CONGLOMERATES HAS NOT RESULTED IN IMPROVED MANAGEMENT; THEY RARELY RESULT IN ECONOMIES OF SCALE; THEY OFTEN DECREASE RATHER THAN ENHANCE COMPETITION; AND THEIR ACCUMULATION OF LARGE AMOUNTS OF CAPITAL OFTEN DOES NOT WORK TO THE OVERALL ADVANTAGE OF OUR POLITICAL AND ECONOMIC SYSTEM.

MOREOVER I BELIEVE THAT THE LARGE CONGLOMERATES HAVE, OVERALL, BEEN A NEGATIVE INFLUENCE ON OUR ECONOMY AND OUR SOCIETY. I ALSO BELIEVE THAT THEIR PREOCCUPATION WITH THE SO-CALLED BOTTOM LINE OF PROFIT AND LOSS STATEMENTS, COUPLED WITH A LUST FOR EXPANSION, IS CREATING AN ENVIRONMENT IN WHICH FEWER BUSINESSMEN HONOR TRADITIONAL VALUES; WHERE RESPONSIBILITY IS INCREASINGLY DISASSOCIATED FROM THE EXERCISE OF POWER; WHERE SKILL IN FINANCIAL MANIPULATION IS VALUED MORE THAN ACTUAL KNOWLEDGE AND EXPERIENCE IN THE BUSINESS; WHERE ATTENTION AND EFFORT IS DIRECTED MOSTLY TO SHORT TERM CONSIDERATIONS, REGARDLESS OF LONGER RANGE CONSEQUENCES; AND WHERE A FEW, HIGH LEVEL INDIVIDUALS, BY CONTROLLING THE VAST RESOURCES OF A LARGE CONGLOMERATE, CAN EXERCISE UNDUE INFLUENCE ON GOVERNMENT.

WITH THE GROWTH OF CONGLOMERATES, POLITICAL AND ECONOMIC POWER IS INCREASINGLY CONCENTRATED AMONG A FEW LARGE CORPORATIONS AND THEIR DIRECTORS--POWER THEY CAN APPLY AGAINST SOCIETY, GOVERNMENT, AND INDIVIDUALS. WE ARE IN DANGER THAT THESE LARGE CONGLOMERATES ARE BECOMING, IN EFFECT, ANOTHER BRANCH OF GOVERNMENT--HAVING THE POWER OF GOVERNMENT, BUT WITHOUT THE CHECKS AND BALANCES INHERENT IN A DEMOCRACY.

WOODROW WILSON WARNED THAT ECONOMIC CONCENTRATION COULD "GIVE TO A FEW MEN A CONTROL OVER THE ECONOMIC LIFE OF THE COUNTRY WHICH THEY MIGHT ABUSE TO THE UNDOING OF MILLIONS OF MEN." HIS STATED PURPOSE WAS: "TO SQUARE EVERY PROCESS OF OUR NATIONAL LIFE AGAIN WITH THE STANDARDS WE SO PROUDLY SET UP AT THE BEGINNING AND HAVE ALWAYS CARRIED IN OUR HEARTS." HIS COMMENTS ARE APROPOS TODAY.

CONGLOMERATE OFFICIALS OFTEN HAVE GREATER POWER THAN ELECTED OR APPOINTED GOVERNMENT OFFICIALS TO INFLUENCE SOCIETY. YET THEY ARE NOT SUBJECT TO PUBLIC SCRUTINY. THE ABILITY TO DISPENSE MONEY PROVIDES THEIR POWER. THIS VIOLATES THE BASIC RIGHT OF INDIVIDUALS TO ELECT THEIR POLITICAL LEADERS.

BY USING THEIR GREAT INFLUENCE, THEY SUCCEED IN GETTING CHOSEN INDIVIDUALS APPOINTED TO TOP GOVERNMENT JOBS BY EXTENSIVE LOBBYING AND BY CAMPAIGN CONTRIBUTIONS. CONGLOMERATES HAVE SUCCESSFULLY INSTILLED THEIR VIEWPOINT IN MANY AREAS OF GOVERNMENT. TO SOME GOVERNMENT OFFICIALS, THE PROSPECT OF FUTURE EMPLOYMENT WITH LARGE CONGLOMERATES MAY INFLUENCE THEIR ACTIONS. MOREOVER, LARGE CONGLOMERATES WORKING BEHIND THE SCENES OR EVEN PUBLICLY MAY INFLUENCE THE CAREERS OF GOVERNMENT EMPLOYEES.

LET ME GIVE YOU AN EXAMPLE OF WHAT CAN HAPPEN TO A GOVERNMENT EMPLOYEE WHO HAS THE TERMERITY TO "TAKE ON" A LARGE CONGLOMERATE. SEVERAL YEARS AGO ONE LARGE CONGLOMERATE WAS IN THE PROCESS OF SUBMITTING LARGE CLAIMS AGAINST THE NAVY. THESE CLAIMS INVOLVED WORK UNDER MY COGNIZANCE. AT THE SAME TIME I WAS WORKING HARD TO SEE THAT THE GOVERNMENT DID NOT SETTLE CLAIMS FOR MORE THAN THE GOVERNMENT CONTRACTUALLY OWED. THE COMPANY RETAINED A WELL-KNOWN WASHINGTON LOBBYIST WHO WORKED BEHIND THE SCENES TO BLOCK MY REAPPOINTMENT ON ACTIVE DUTY. IN HIS YOUNGER DAYS THIS LOBBYIST WAS AN IDEALIST, BUT LATER TURNED TO THE PURSUIT OF MONEY AS SO MANY LAWYERS DO.

THE LOBBYIST'S EFFORTS WERE UNSUCCESSFUL. BUT IT IS INTERESTING TO NOTE THAT EVEN AS THE SECRETARY OF THE NAVY HAD ME IN HIS OFFICE TO DISCUSS MY CONTINUATION IN MY PRESENT POSITION, THIS LOBBYIST IN A LENGTHY TELEPHONE CONVERSATION

MADE A FINAL, LAST MINUTE APPEAL AGAINST MY REAPPOINTMENT, OR, IF I WERE TO BE REAPPOINTED, HE WANTED ME ASSIGNED TO DUTY SOMEWHERE--PERHAPS TO KAMCHATKA--WHICH IS 12,500 MILES FROM WASHINGTON--WHERE I WOULD NOT BE INVOLVED IN HIS CLIENT'S ACTIVITIES WITH THE NAVY.

CONGLOMERATES HAVE READY ACCESS TO HIGH LEVEL GOVERNMENT OFFICIALS IN THE EXECUTIVE AND LEGISLATIVE BRANCHES. ALTHOUGH THESE OFFICIALS MAY NOT BE FAMILIAR WITH THE SPECIFIC DETAILS OF THE ISSUES PRESENTED TO THEM, THEY OFTEN TAKE ACTIONS WHICH UNDERMINE THEIR SUBORDINATES. KNOWING THIS, SOME LARGE DEFENSE CONTRACTORS ARE INCREASINGLY MAKING IT A PRACTICE TO CONDUCT IMPORTANT BUSINESS WITH THE HIGHER OFFICIALS IN THE GOVERNMENT'S CHAIN OF COMMAND. IN THEIR ZEAL TO DEMONSTRATE THEIR APPRECIATION OF THE PROBLEMS OF THESE LARGE CONTRACTORS, DEFENSE DEPARTMENT OFFICIALS DO NOT ALWAYS PROTECT, AS THEY SHOULD, THE INTERESTS OF THE TAXPAYER.

AS CONGLOMERATES INCREASE IN NUMBER, SIZE, AND DIVERSIFICATION, ESPECIALLY THOSE DEALING WITH ESSENTIAL WORLD COMMODITIES OR SOPHISTICATED DEFENSE EQUIPMENT, THEIR INFLUENCE WITHIN OUR OWN GOVERNMENT AND WITH FOREIGN GOVERNMENTS CAN BECOME ENORMOUS.

THE POWER OF TODAY'S LARGE CONGLOMERATES CAN TRANSCEND NATIONAL POWER AND NATIONAL LOYALTIES. THE PRESIDENT AND THE CONGRESS ARE NO LONGER THE SOLE INSTRUMENTS FOR THE CONDUCT OF FOREIGN POLICY; LARGE CONGLOMERATES ARE THEMSELVES EMERGING AS INTERNATIONAL POWERS.

AS WE HAVE READ IN THE PRESS, THEY HAVE BEEN ACTIVE BEHIND-THE-SCENES IN INTERNATIONAL POLITICS. THEIR INVOLVEMENT IN INTERNATIONAL AFFAIRS IS AIMED AT FURTHERING THEIR OWN ECONOMIC

INTERESTS, WHICH MAY NOT NECESSARILY COINCIDE WITH THE BEST INTERESTS OF THE UNITED STATES OR THE OTHER COUNTRIES INVOLVED. THEIR MEASURE OF SUCCESS OR FAILURE IS SOLELY ONE OF PROFIT FOR THE CONGLOMERATE.

THE BEHIND-THE-SCENES ACTIVITIES OF LARGE CONGLOMERATES MAY LEAD TO MILITARY, POLITICAL, AND SOCIAL RAMIFICATIONS FOR OUR PEOPLE AS WELL AS THOSE OF OTHER COUNTRIES. THESE LARGE CORPORATIONS ARE RESPONSIBLE ONLY TO THEMSELVES. THEY ARE NOT OPEN TO EFFECTIVE SCRUTINY BY THE PUBLIC OR BY THOSE LEGALLY EMPOWERED AND REQUIRED TO ADMINISTER THIS NATION'S FOREIGN POLICY.

IN SUCH AN ENVIRONMENT, NATIONAL INTERESTS MAY BE COMPROMISED. THE PRESSURE OF CONGLOMERATES TO PROMOTE OVERSEAS BUSINESS AND PROFITS HAS LED TO THE EXPORT OF VALUABLE HIGH-LEVEL TECHNOLOGY TO COUNTRIES IN FIELDS IN WHICH WE HAVE TRADITIONALLY ENJOYED AN ECONOMIC AND MILITARY ADVANTAGE. THE TAMPERING OF CONGLOMERATES COULD CONCEIVABLY CAUSE FOREIGN GOVERNMENTS TO FAIL. BUT IF THIS PRODUCED ADDITIONAL REVENUE FOR THE CONGLOMERATE, I SUPPOSE THE EFFORT WOULD BE CONSIDERED BY THEM A SUCCESS.

IT MAY BE THAT AT THIS STAGE OF WORLD INDUSTRIAL DEVELOPMENT, CONGLOMERATES HAVE, IN ACTUALITY, AMASSED SUCH GREAT POLITICAL AND ECONOMIC POWER THAT THEY MUST BE CONSIDERED AS PARTICIPANTS IN INTERNATIONAL DEALINGS. IF THIS IS SO, THEIR PARTICIPATION SHOULD BE OPENLY RECOGNIZED AND ACKNOWLEDGED, AND APPROPRIATE GOVERNMENT CONTROLS ESTABLISHED. OTHERWISE THEY CAN CREATE COMMITMENTS FOR THE UNITED STATES CONTRARY TO OUR POLICY.

With their vast influence on Government, many large conglomerates have effectively usurped the rights of legislators, but without assuming any of the responsibilities. In the business world too, the officials of large conglomerates--aided by shrewd, high priced lawyers--seek to evade moral and legal liability for the companies they own and control.

Many years ago I was dealing with the president of a subsidiary of a large conglomerate in connection with placement of a multi-million dollar contract. To my surprise, I learned, in discussions with him, that the parent conglomerate exercised such tight control over his activities that he could not even approve the purchase of a $10,000 item of capital equipment for this job without first obtaining approval from the president of the conglomerate. Since the latter was on vacation, and he could not contact him, we could not transact business.

Although this conglomerate maintained tight control of the subsidiary and could draw out the profits, I also discovered it bore no responsibility for the contractual obligations of its subsidiary. This was my introduction to the so-called corporate veil through which profits and cash can flow upwards to corporate headquarters, but which cuts off financial or legal liability. I refused to do business on this basis. Eventually special arrangements were made for this contract to ensure that the parent corporation would stand behind the obligations of the subsidiary.

SINCE THAT TIME, I HAVE SEEN OTHER INSTANCES WHERE SENIOR CORPORATE OFFICIALS REFUSED TO STAND BEHIND THE CONTRACTUAL COMMITMENTS OF THEIR SUBSIDIARIES. WHILE THEY SEEK PROFITS FROM THEIR SUBSIDIARIES, THEY ARE OFTEN UNWILLING TO ACCEPT THE LOSSES. EVEN WHEN THE PARENT CONGLOMERATES HAVE HAD AMPLE FUNDS, THEY RATIONALIZED THAT, AS PRUDENT BUSINESSMEN, IT WOULD BE WRONG FOR THEM TO KEEP INVESTING IN A SUBSIDIARY THAT IS NOT EARNING ENOUGH. THUS THE PROBLEM IS SHIFTED TO THE CUSTOMER--OFTEN THE GOVERNMENT--EITHER PAY WHAT THE CONTRACTOR DEMANDS OR LOSE A VITAL SUPPLIER.

IN AN ENVIRONMENT WHERE RESPONSIBILITY IS INCREASINGLY DIVORCED FROM AUTHORITY, TRADITIONAL BUSINESS VALUES TEND TO BE LOST. CONTRACTS OFTEN BECOME MEANINGLESS. IT USED TO BE THAT A BUSINESSMAN'S HONOR DEPENDED ON HIS LIVING UP TO HIS CONTRACT--A DEAL WAS A DEAL. NOW, HONORING CONTRACTS IS BECOMING MORE A MATTER OF CONVENIENCE. CORPORATIONS ARE INCREASINGLY TURNING TO LAWYERS WHO, BY LEGAL MANEUVERING, OBFUSCATION, AND DELAY, CAN EFFECTIVELY VOID ALMOST ANY CONTRACT. THERE ARE WASHINGTON LAW FIRMS WITH FOUR OR FIVE FANCY ANGLO-SAXON NAMES, SUCH AS ABERCROMBIE, BLATCHFORD, CARRUTHERS, SUYDENHAM AND COHEN WHICH COULD INVALIDATE THE TEN COMMANDMANTS--AND SOMETIMES DO.

UNDER THESE CIRCUMSTANCES CONTRACTS WITH A LARGE CONGLOMERATE ARE BINDING ONLY TO THE EXTENT IT AGREES TO BE BOUND, ESPECIALLY WHEN THE GOVERNMENT IS THE CUSTOMER.

SOME SENIOR CONGLOMERATE OFFICIALS SEEK TO AVOID RESPONSIBILITY BY INSULATING THEMSELVES FROM THE "DETAILS." FOR EXAMPLE, FACED WITH LARGE COST OVERRUNS, THE OFFICIALS OF ONE LARGE CONGLOMERATE

PLACED THE BLAME ON THE GOVERNMENT, CITING POOR PROCUREMENT PRACTICES, UNFAIR CONTRACTS, EXCESSIVE DESIGN CHANGES, AND SO ON. THESE EXCUSES WERE MADE BY CORPORATE OFFICIALS AND THEIR LOBBYISTS TO THE PRESS, TO THE EXECUTIVE BRANCH, AND TO CONGRESS. IT WAS A CONVENIENT EXPLANATION OF THE PROBLEMS, AND CAST NO ASPERSIONS ON MANAGEMENT PERFORMANCE. NO DOUBT SOME MANAGERS AND SUPERVISORS INVOLVED IN THE WORK ALSO TOOK ADVANTAGE OF THE SITUATION TO EXCUSE THEIR MISTAKES. BUT THE STORIES THEY PUT OUT DID NOT SQUARE WITH THE FACTS.

I INVITED THE CHAIRMAN OF THE BOARD OF THIS CONGLOMERATE TO MEET WITH ME AND HEAR, FIRST HAND, DISPARITIES BETWEEN THE FACTS AND THE INFORMATION BEING PUBLICIZED BY THE PERSON IN CHARGE OF HIS SUBSIDIARY. HE ANSWERED THAT IT WOULD BE "UNWISE" FOR HIM TO GET INVOLVED, BUT THAT HE WOULD ARRANGE TO SEE ME ON ONE OF HIS VISITS TO WASHINGTON. THAT WAS MORE THAN TWO YEARS AGO, AND HE HAS YET TO VISIT ME.

MUCH OF THE PROBLEM CAUSED BY LARGE CORPORATIONS STEMS FROM THE NOTION THAT BEING "PERSONS" IN LAW, THEY ARE ENTITLED TO THE PROTECTION OF THE 14TH AMENDMENT.

IN 1873 THE SUPREME COURT HELD IN THE SLAUGHTER-HOUSE CASES THAT THE 14TH AMENDMENT DID NOT APPLY TO CORPORATIONS; THAT THE WORD "PERSON" IN THE PHRASE "NOR SHALL ANY STATE DEPRIVE ANY PERSON OF LIFE, LIBERTY, OR PROPERTY WITHOUT DUE PROCESS OF LAW"--WHICH WAS COPIED FROM THE FIFTH AMENDMENT--WAS INTENDED TO PROTECT THE NEWLY EMANCIPATED SLAVES. "WE ARE CONVINCED," SAID MR. JUSTICE MILLER, SPEAKING FOR THE COURT, "THAT THE SOLE 'PERVADING PURPOSE' OF THIS AND THE OTHER WAR AMENDMENTS WAS 'THE FREEDOM OF THE SLAVE ACT'."

The judges of the Court were contemporaries of Congress and the State Legislatures enacting the amendment and, therefore, familiar with what the amendment was intended to accomplish.

In 1886, however, in the famous case--Santa Clara County v. Southern Pacific Railroad, the 14th Amendment was applied to a corporation and the Supreme Court to this day has sustained this view.

I submit that if a corporation is to be assimilated to a natural person for purposes of protection under the 14th amendment, then all the obligations incumbent on "natural persons" ought also to be binding on the corporation. And, since the corporation acts through its officials, these should be held personally liable for illegal corporate acts. Woodrow Wilson stated the issue clearly:

> "I regard the corporation as indispensable to modern business enterprise. I am not jealous of its size or might, if you will but abandon at the right points the fatuous, antiquated, and quite unnecessary fiction which treats it as a legal person; if you will but cease to deal with it by means of your law as if it were a single individual not only, but also--what every child may perceive it is not--a responsible individual."

I have had experience with corporate behavior which by a "natural person" would be considered illegal. It seems to me that where officials of a corporation, acting for it, commit the corporation to illegal acts they should be held personally accountable. I cannot see how a corporation can be compelled

TO ACT AS A "RESPONSIBLE INDIVIDUAL," TO USE WILSON'S PHRASE, UNLESS THIS RESPONSIBILITY IS ATTACHED TO THE HUMAN BEINGS WHO SPEAK AND ACT FOR IT.

I BELIEVE THAT SENIOR CORPORATE OFFICIALS CAN AND SHOULD BE HELD RESPONSIBLE FOR THEIR ACTS. IN THIS REGARD THE DECISION MADE BY THE SUPREME COURT IN THE PARKS CASE SEVERAL YEARS AGO OFFERS SOME ENCOURAGEMENT. THE COURT HELD IN THAT CASE THAT UNDER THE FOOD AND DRUG ACT SENIOR CORPORATE OFFICIALS COULD NOT DENY RESPONSIBILITY FOR THE ACTIONS OF THEIR SUBORDINATES, EVEN THOUGH THEY MAY HAVE HAD NO PERSONAL KNOWLEDGE OF THOSE ACTIONS. THIS IS AKIN TO THE AGE-OLD MARITIME TRADITION WHICH HOLDS THE CAPTAIN OF A SHIP RESPONSIBLE FOR THE LOSS OF HIS SHIP, EVEN IF THE DIRECT CAUSE WAS AN ACT BY HIS SUBORDINATE. I BELIEVE THAT THE PRINCIPLE ENUNCIATED IN THE PARKS CASE NEEDS TO BE MADE A MATTER OF LAW APPLICABLE TO CONGLOMERATE OFFICIALS.

UNDER THE CONGLOMERATE PHILOSOPHY, MANAGERS TEND TO BE MEASURED STRICTLY IN FINANCIAL TERMS. A FOUNDER OF ONE OF THE NATION'S LARGEST CONGLOMERATES EXPRESSED IT THIS WAY, "THE EFFICIENCY AND EFFICACY WITH WHICH HE PERFORMS HIS JOB IS, IN OUR SYSTEM, MEASURED BY THE PROFIT WHICH THE BUSINESSMAN ACHIEVES FOR HIS ENTERPRISE."

CERTAINLY THE PROFIT MOTIVE IS AND SHOULD BE THE DRIVING FORCE IN THE CAPITALIST SYSTEM--THE FREE ENTERPRISE SYSTEM IS BASED ON IT. HOWEVER, IN THEIR WORLD OF FINANCIAL STATEMENTS, STATISTICAL REPORTS, STOCK CERTIFICATES, TENDER OFFERS, PRESS RELEASES, AND SO ON, CONGLOMERATE MANAGERS OFTEN LOSE SIGHT OF THE MEN, MATERIALS, MACHINES AND CUSTOMERS OF THE COMPANIES

THEY CONTROL. PREOCCUPIED WITH REPORTS AND NUMBERS RATHER THAN PEOPLE AND THINGS, THERE IS A TENDENCY TO OVERSIMPLIFY OPERATING PROBLEMS AND THEIR SOLUTIONS. FURTHER, BY FOCUSING, PERHAPS TOO STRONGLY, ON SO-CALLED BOTTOM LINE RESULTS, CORPORATE OFFICIALS CAN GENERATE PRESSURES THAT CAUSE SUBORDINATES TO ACT IN WAYS THEY WOULD NOT CONSIDER PROPER IN THEIR PERSONAL BUSINESS.

UNDER PRESSURE TO MEET ASSIGNED CORPORATE PROFIT OBJECTIVES, SUBORDINATES SOMETIMES OVERSTEP THE BOUNDS OF PROPRIETY--EVEN THE LAW. THE CORPORATE OFFICIALS WHO GENERATE THESE PRESSURES, HOWEVER, ARE HIDDEN BEHIND THE REMOTE CORPORATE SCREEN, AND ARE RARELY, IF EVER HELD ACCOUNTABLE FOR THE RESULTS.

IN RECENT YEARS, SOME LARGE CONGLOMERATES HAVE SUBMITTED GROSSLY INFLATED CLAIMS, TOTALING HUNDREDS OF MILLIONS OF DOLLARS, AGAINST THE GOVERNMENT. THESE LARGE SO-CALLED OMNIBUS CLAIMS DO NOT SHOW A CAUSE AND EFFECT RELATIONSHIP BETWEEN ALLEGED GOVERNMENT RESPONSIBLE ACTIONS AND THE AMOUNT CLAIMED. IN ESSENCE, A CONTRACTOR, FACED WITH A PROJECTED COST OVERRUN, MAKES A LARGE CLAIM BASED ON GENERAL ALLEGATIONS THAT THE GOVERNMENT IS AT FAULT AND THEREFORE SHOULD REIMBURSE THE CONTRACTOR FOR ALL HIS COSTS PLUS HIS DESIRED PROFIT--REGARDLESS OF HIS PERFORMANCE ON THE CONTRACT.

THESE LARGE CLAIMS SEEM TO BE "BUILT BACKWARDS." THAT IS, THE CONTRACTOR ESTIMATES HOW MUCH HE WANTS AND THEN ASSIGNS PEOPLE TO MAKE UP A CLAIM THAT WILL YIELD THAT AMOUNT. HERE IS AN EXTRACT FROM A REPORT OF ONE INTERNAL COMPANY MEETING IN WHICH EMPLOYEES WERE INSTRUCTED HOW TO PREPARE A LARGE CLAIM:

> "Division Planning will provide an estimate of manhours to complete the contract. This estimate will be compared with the original of total manufacturing manhours to do the contract, and the difference will be justified in a saleable manner.

* * * * * * * *

> "Mr. (X) stated that (the company) would have to use that information and data which would sell. Any data which would not sell would have to be omitted."

Sometimes the claims are structured so that the company could appear to be accommodating by settling for a fraction of the claimed amount, while still achieving the desired objective. In one case, the Government requested that the senior contractor official certify that the company's claim was current, complete, and accurate. Company officials replied he would do so only if the Navy would stipulate beforehand in effect that "current" would not mean "current," "complete" would not mean "complete" and "accurate" would not mean "accurate."

In generating inflated claims, some company officials may have lost sight of the federal statutes which prohibit the preparation and submission of false claims against the Government. I, along with other Navy officials, have reported to my superiors numerous instances of possible fraud in connection with these inflated claims. The Navy has formally referred the claims of four large conglomerates to the Justice Department for investigation. To date one company has been indicted for fraud. According to the press, another is the subject of a grand jury investigation. Two others are still being investigated by the Justice Department.

I BELIEVE THAT GROSSLY INFLATED CLAIMS OF THE TYPE RECEIVED BY THE GOVERNMENT IN RECENT YEARS ARE TO SOME EXTENT AN OUTGROWTH OF THE CONGLOMERATE ENVIRONMENT, WHEREIN THE MANAGERS OF SUBSIDIARIES ARE HELD TO PROFIT OBJECTIVES DICTATED BY THEIR SUPERIORS AT CORPORATE HEADQUARTERS.

CONGLOMERATE OFFICIALS OFTEN RECEIVE BONUSES AND STOCK OPTIONS, WHOSE VALUE DEPENDS ON THE PRICE OF THE COMPANY'S STOCK. THE PRICE OF THE STOCK IN TURN IS INFLUENCED BY THE COMPANY'S PUBLISHED PROFIT FIGURES AND OTHER FINANCIAL DATA. THESE FIGURES ARE WIDELY ACCEPTED AS MAJOR INDICATORS OF MANAGEMENT PERFORMANCE AND CORPORATE FINANCIAL STRENGTH. A COMPANY'S ABILITY TO MAINTAIN THE PRICE OF ITS STOCK, TO BORROW MONEY, AND TO EXPAND, DEPEND ON CONVEYING A FAVORABLE IMPRESSION TO THE PUBLIC THROUGH ITS FINANCIAL REPORTS. IN TURN, THE PUBLIC RELIES HEAVILY ON THESE REPORTS IN DECIDING WHETHER TO BUY OR SELL STOCK; EXTEND CREDIT; OR ENGAGE IN OTHER COMMERCIAL TRANSACTIONS WITH A COMPANY.

WHILE PROFIT FIGURES MAY BE A CONVENIENT BASIS TO ASSESS MANAGEMENT PERFORMANCE, THEY CAN BE MANIPULATED, PARTICULARLY IN THE CASE OF LARGE CONGLOMERATES WITH THEIR VARIOUS BUSINESSES.

THROUGH "CREATIVE" ACCOUNTING, A LARGE CONGLOMERATE CAN TAILOR ITS FINANCIAL STATEMENTS TO PRESENT A PICTURE QUITE DIFFERENT THAN WARRANTED BY THE COMPANY'S PERFORMANCE.

- THE WELL PUBLICIZED LOCKHEED AND PENN CENTRAL CASES DEMONSTRATE THAT LARGE CORPORATIONS CAN CONTINUE TO GENERATE OPTIMISTIC FINANCIAL REPORTS ALMOST TO THE POINT OF BANKRUPTCY.

- FOR 1978, ONE LARGE CONGLOMERATE REPORTED RECORD AFTER-TAX PROFITS TOTALING MORE THAN $100 MILLION. THIS FIGURE, HOWEVER, WAS PREDICATED ON THE COMPANY RECOVERING EIGHT TIMES THAT AMOUNT IN CLAIMS AGAINST THE GOVERNMENT. HOWEVER, SIX MONTHS LATER, THE COMPANY ENTERED INTO A CLAIMS SETTLEMENT AGREEMENT WHICH ENTAILED WRITING OFF A $359 MILLION BEFORE-TAX LOSS. ALTHOUGH THE REPORTED LOSS ON THIS CONTRACT EXCEEDED THE CONGLOMERATE'S RECORD PROFITS REPORTED A FEW MONTHS EARLIER, THE PRICE OF THE STOCK DOUBLED ON NEWS OF THE SETTLEMENT. THIS RESULTED IN COMPANY OFFICIALS MAKING LARGE PROFITS ON ANY STOCK THEY MAY HAVE HELD. SIX MONTHS LATER THE COMPANY WAS ONCE AGAIN REPORTING RECORD FOURTH QUARTER PROFITS.
- IN PRESSING FOR QUICK SETTLEMENT OF CLAIMS, THE OFFICIALS OF ONE LARGE CONGLOMERATE REPEATEDLY TOLD SENIOR DEFENSE OFFICIALS THAT THE COMPANY FACED HUNDREDS OF MILLIONS OF DOLLARS IN POTENTIAL LOSSES IN ONE OF THEIR DIVISIONS INVOLVED PRIMARILY IN DEFENSE WORK. YET, BY ASSUMING LARGE CLAIM PAYMENTS FROM THE GOVERNMENT, THEY WERE, YEAR AFTER YEAR, REPORTING TO THE PUBLIC INCREASING PROFITS--EVEN RECORD PROFITS--FOR THIS SAME WORK.
- ONE CONGLOMERATE, IN TAKING OVER A MAJOR DEFENSE COMPANY, ARRANGED FOR IT TO WRITE OFF A $27 MILLION LOSS FOR THE 8 MONTH PERIOD JUST PRIOR TO THE TAKEOVER--THE FIRST LOSS IN MANY YEARS. FOR THE FOUR MONTHS AFTER THE TAKEOVER, THE CONGLOMERATE REPORTED A $4

> MILLION PROFIT. THE FINANCIAL REPORTS AND PRESS RELEASES CREATED AN IMPRESSION THAT THE TURNAROUND WAS THE PRODUCT OF THE NEW CONGLOMERATE MANAGEMENT. YET, EXCEPT FOR THE ASSIGNMENT OF A FEW FINANCIALLY ORIENTED PEOPLE TO THE TOP JOBS, THERE WAS NO NOTICEABLE CHANGE IN PERFORMANCE. BY AND LARGE THE WORK WAS DONE BY THE SAME PEOPLE, FOLLOWING ROUGHLY THE SAME PROCEDURES AS BEFORE THE TAKEOVER.

PUBLIC ACCOUNTANTS ARE EXPECTED TO ACT AS SAFEGUARDS AGAINST UNRELIABLE FINANCIAL REPORTING. BUT THEY ARE UNDER INTENSE PRESSURE TO GO ALONG WITH THE COMPANY'S ACCOUNTING METHODS, LEST THEY LOSE THE ACCOUNT TO A COMPETITOR. MOREOVER, PUBLIC ACCOUNTANTS CERTIFY ONLY THAT ALL IS IN ACCORDANCE WITH SO-CALLED GENERALLY ACCEPTED ACCOUNTING PRINCIPLES--WHICH IN PRACTICE IS A EUPHEMISM FOR "ANYTHING GOES." AS PETER DRUCKER SAID: "...ANY ACCOUNTANT WORTH HIS SALT CAN CONVERT ANY PROFIT FIGURE INTO A LOSS OR VICE VERSA IF GIVEN CONTROL OF THE ACCOUNTING DEFINITIONS ALL UNQUESTIONABLY 'WITHIN THE LIMITS OF PROPER ACCOUNTING PRACTICE.'"

SOME CONTEND THAT THE ENTRANCE OF A CONGLOMERATE INTO A NEW MARKET THROUGH ACQUISITION OR MERGER TENDS TO STIMULATE COMPETITION. IN FACT, THE FINANCIAL RESOURCES OF THESE CONGLOMERATES PROVIDE THEM WITH AN UNFAIR ADVANTAGE OVER COMPETITORS. THEY CAN AFFORD TO UNDERBID THEIR SMALLER COMPETITORS--BIDDING AT A LOSS IF NECESSARY--IN ORDER TO CORNER A LARGER SHARE OF THE NEW MARKET. IN THE SHORT TERM, THIS MIGHT APPEAR TO BE COMPETITION, BUT IN THE LONG RUN IT IS ACTUALLY ANTI-COMPETITIVE.

CONGLOMERATES ARE SAID TO CREATE ECONOMIES OF SCALE. BUT HOW CAN ECONOMIES OF SCALE RESULT WHEN CONGLOMERATES ACQUIRE COMPANIES INVOLVED IN SUBSTANTIALLY DIFFERENT PRODUCTS? WHAT ECONOMIES OF SCALE RESULT, FOR EXAMPLE, FROM THE COMBINATION OF OIL, CATTLE, AND SHIPBUILDING BUSINESSES?

SOME CONTEND THAT THE VALUE OF CONGLOMERATES IS IN THEIR ABILITY TO ACCUMULATE LARGE AMOUNTS OF CAPITAL FOR VARIOUS BUSINESS VENTURES. THE HEAD OF ONE LARGE CONGLOMERATE HAS PUBLICLY LIKENED THE ROLE OF HIS COMPANY HEADQUARTERS TO THAT OF A BANKER, ALLOCATING MONEY TO SUBSIDIARIES. IT SEEMS TO ME THAT CONGLOMERATES ARE NOT NECESSARY FOR THIS PURPOSE; THE BANKING COMMUNITY IS ABLE TO DO THIS JOB. MANY OF THE COMPANIES ACQUIRED, AND THOSE THAT ARE THE MOST ATTRACTIVE TARGETS FOR TAKEOVER BY CONGLOMERATES, DO NOT REQUIRE THE FINANCIAL RESOURCES OF A PARENT CORPORATION. THEY ARE ALREADY SUCCESSFUL AND SO HAVE NO DIFFICULTY BORROWING MONEY FROM BANKS. CONGLOMERATES OFTEN SIMPLY DIVERT MONEY FROM THE ACQUIRED COMPANIES TO SUPPORT CONGLOMERATE OVERHEAD EXPENSES; TO FUND NEW ACQUISITIONS; OR TO BAIL OUT THEIR LESS SUCCESSFUL VENTURES. IN THE FREE ENTERPRISE SYSTEM, EFFICIENT COMPANIES SURVIVE; THE INEFFICIENT ONES FAIL. CONGLOMERATES, IN ACTUALITY, TEND TO DISTORT THIS PROCESS.

THE GREATEST MYTH ABOUT CONGLOMERATES IS THAT THEY PROVIDE BETTER MANAGEMENT EXPERTISE FOR THE COMPANIES THEY ACQUIRE. I BELIEVE THAT THE CONGLOMERATE STRUCTURE IS NOT CONDUCIVE TO GOOD MANAGEMENT. WITH THEIR GROWTH HAS COME THE IDEA THAT DETAILED KNOWLEDGE OF THE PRODUCT OR SERVICES IS NOT ESSENTIAL TO THE SOUND MANAGEMENT OF A BUSINESS. MANAGERS OF CONGLOMERATES

ARE OFTEN FINANCIAL AND ADMINISTRATIVE "EXPERTS," WHO HAVE BEEN SCHOOLED IN MODERN MANAGEMENT TECHNIQUES, BUT WHO HAVE LITTLE KNOWLEDGE OR EXPERIENCE IN THE ENTERPRISES THEY MANAGE.

TODAY'S MANUFACTURING AND ENGINEERING TECHNIQUES ARE COMPLICATED. PROPER MANAGEMENT OF COMPLEX MANUFACTURING REQUIRES DETAILED KNOWLEDGE AND THE INTUITION THAT GENERALLY CAN BE DEVELOPED ONLY THROUGH YEARS OF EXPERIENCE IN THE PARTICULAR TYPE OF WORK.

FOLLOWING A TAKEOVER, CONGLOMERATES NEARLY ALWAYS SEND IN THEIR OWN MANAGERS TO RUN THE SUBSIDIARY. FOR THE MOST PART, I HAVE BEEN UNIMPRESSED BY THE PERFORMANCE OF THE ADMINISTRATORS AND FINANCIAL EXPERTS THEY PLACE IN CHARGE. FOR EXAMPLE, FOLLOWING THE TAKEOVER OF A MAJOR PRIVATE SHIPYARD, A LARGE CONGLOMERATE DECIDED TO INVEST OVER $200 MILLION IN A PLANT FOR COMMERCIAL WORK, ADJACENT TO AN EXISTING PLANT ALREADY FULLY COMMITTED TO NAVY CONTRACTS. THE WORK TO BE PERFORMED AT THE NEW FACILITIES COULD ONLY DRAW FROM THE SAME LABOR MARKET. AFTER THE EXPANSION, THE COMPANY WAS UNABLE TO ACQUIRE AND TRAIN ENOUGH SKILLED WORKERS TO MEET ITS CONTRACT COMMITMENTS TO THE NAVY AND TO ITS COMMERCIAL CUSTOMERS. MOREOVER, THE COMMERCIAL BUSINESS DID NOT MATERIALIZE AS ANTICIPATED BY THE COMPANY. TO DATE, THE COMPANY HAS REPORTED SUBSTANTIAL LOSSES ON THE NEW COMMERCIAL FACILITIES. HAD THE DECISION BEEN LEFT TO THOSE EXPERIENCED AND KNOWLEDGEABLE IN THEIR BUSINESS, IT IS UNLIKELY THE COMPANY WOULD HAVE UNDERTAKEN THE EXPANSION.

EVEN IN CASES WHERE A CONGLOMERATE DOES NOT REPLACE THE MANAGEMENT OF ACQUIRED COMPANIES, THE EXTRA LAYERS OF ADMINISTRATION AND OVERHEAD EXPENSES TEND TO MAKE IT HARDER TO DO A JOB. THE LOCAL MANAGER, ONCE TOTALLY IN CHARGE OF HIS OPERATION, IS NOW CONSTRAINED BY CORPORATE CONSIDERATIONS. AS THE DISTANCE GROWS BETWEEN THOSE WHO DO THE WORK AND THOSE WHO MAKE THE DECISIONS, THE ABILITY OF LOCAL MANAGEMENT TO RESPOND TO PROBLEMS DECLINES.

EXCESSIVE ORGANIZATIONAL LAYERING AND LONG-DISTANCE MANAGEMENT HAVE, FOR YEARS, BEEN A MAJOR IMPEDIMENT TO THE EFFICIENT OPERATION OF THE DEFENSE DEPARTMENT. THE CONGLOMERATES ARE HEADING IN THE SAME DIRECTION. THE RAPID GROWTH OF CONGLOMERATES IS NOT SURPRISING. IN FACT, THE SIMPLE ACT OF ACQUIRING ANOTHER COMPANY CONVEYS TO STOCKHOLDERS THE IMPRESSION OF VIGOROUS MANAGEMENT AND GROWTH. EACH ACQUISITION GENERALLY OFFERS AMPLE ACCOUNTING OPPORTUNITIES TO PRESENT A CONGLOMERATE'S FINANCIAL CONDITION IN A DIFFERENT, AND MORE FAVORABLE LIGHT. GROWTH OF THIS SORT TENDS TO ENHANCE THE PRICE OF STOCK HELD BY THE ACQUIRING FIRM AND BY THE FIRM BEING TAKEN OVER--A CASE WHERE THE WHOLE IS GREATER THAN THE SUM OF THE PARTS.

MANY PEOPLE THRIVE ON THE COMMISSIONS AND FEES THAT GROW OUT OF CONGLOMERATE MERGERS. ACCOUNTANTS, LAWYERS, ECONOMISTS, AND THE LIKE, BECOME SPECIALISTS IN BUYING AND SELLING BUSINESSES--MUCH AS COMMODITIES TRADERS BUY AND SELL RAILCARS FULL OF MATERIAL THEY NEVER SEE. GROUPS OF EXPERTS ANALYZE POTENTIAL TAKEOVERS, STUDY THE TAX BENEFITS, ARRANGE THE FINANCING, PROCESS THE NECESSARY PAPERWORK, AND HANDLE THE LEGAL PROCEEDINGS. THE TAKEOVER OF ONE OF MY SUPPLIERS GENERATED MORE THAN $6.3 MILLION

IN LEGAL FEES FOR ACQUISITION SPECIALISTS. OBVIOUSLY THESE EXPERTS HAVE A STRONG INCENTIVE TO PROMOTE CONGLOMERATION.

THE GOVERNMENT ITSELF HAS CREATED AN ENVIRONMENT CONDUCIVE TO THE GROWTH OF CONGLOMERATES. THE TAX LAWS, FOR EXAMPLE, FAVOR LARGE CONGLOMERATES. BY CONSOLIDATING FINANCIAL STATEMENTS, CONGLOMERATES ARE ABLE TO OFFSET THE PROFITS OF ONE SUBSIDIARY WITH THE LOSSES OF ANOTHER, THUS REDUCING THEIR TAXES. INDEPENDENT CORPORATIONS PAY TAXES ON DIVIDEND EARNINGS; CONGLOMERATES PAY NO TAX ON DIVIDENDS FROM THEIR SUBSIDIARIES.

I AM A STRONG ADVOCATE OF THE FREE ENTERPRISE SYSTEM. I AM CONCERNED, HOWEVER, THAT IT IS NO LONGER FREE AND IS BECOMING INCREASINGLY LESS ENTERPRISING. CONGLOMERATE OFFICIALS OFTEN PLAY UP THE RISKS OF PRIVATE ENTERPRISE. BUT THE RISKS THEY TAKE ARE NOT NEARLY SO GREAT AS THOSE OF AN ORDINARY CITIZEN WHO INVESTS HIS OWN SAVINGS IN A BUSINESS. THE RISKS THESE OFFICIALS TAKE IS WITH OTHER PEOPLE'S MONEY. INSURANCE POLICIES PAID FOR BY THE CORPORATION GENERALLY PROTECT THESE OFFICIALS FROM ANY PERSONAL LIABILITY. THE PRIMARY RISK THEY TAKE IS THAT OF KEEPING THEIR JOBS. YET, EVEN WHEN AN EXECUTIVE IS DROPPED FROM HIS JOB, HE IS USUALLY FINANCIALLY SECURE FOR THE REST OF HIS LIFE THROUGH SPECIAL RETIREMENT PROVISIONS OR CONSULTANT AGREEMENTS. CONGLOMERATE MANAGERS TEND TO FOCUS ON THE SHORT TERM. THE OPTIMIZATION FORMULAS THEY ARE TAUGHT IN BUSINESS SCHOOL TEND TO PUSH THEM IN THIS DIRECTION, PERHAPS TO THE DETRIMENT OF THE LONGER RANGE INTERESTS OF BUSINESS AND SOCIETY. LARGE CONGLOMERATES, FOR EXAMPLE, HAVE CONTRIBUTED GREATLY TO OUR WASTEFUL CONSUMPTION OF NATURAL RESOURCES, PARTICULARLY ENERGY.

CONGLOMERATES ARE MAKING A MAJOR EFFORT TO WIN PUBLIC CONFIDENCE. WE HAVE ALL SEEN THEIR ADVERTISEMENTS PROMOTING THE CORPORATE VIEWPOINT ON SOCIAL AND ECONOMIC ISSUES. AT TIMES THESE ADVERTISEMENTS ARE NEXT TO THE EDITORIAL PAGE OF NEWSPAPERS, THUS CONVEYING AN IMPRESSION THAT THE NEWSPAPER SUPPORTS THESE VIEWS. OF COURSE, MANY OF THE NEWSPAPERS THEMSELVES ARE OWNED BY CONGLOMERATES AND THEREFORE MANAGEMENT MAY HAVE VIEWS SIMILAR TO THOSE OF THEIR ADVERTISERS. THIS IS ANOTHER AREA IN WHICH THE OLD ADAGE APPLIES: "WHOSE BREAD I EAT, HIS SONG I SING."

IN THIS SAME VEIN, SOME CONGLOMERATES CONTRIBUTE LARGE SUMS TO CHARITIES AND NON-PROFIT ORGANIZATIONS. IT IS IMPORTANT TO BEAR IN MIND, HOWEVER, THAT THESE COSTS ARE PASSED ON TO THE CUSTOMERS OR SUBSIDIZED BY THE GOVERNMENT THROUGH TAX BREAKS. IT IS ALSO WORTH REMEMBERING THAT A $20 MILLION CONTRIBUTION FROM A $32 BILLION A YEAR CONGLOMERATE IS EQUIVALENT TO A $20 GIFT FROM A PERSON WITH A $32,000 A YEAR SALARY. I CANNOT HELP WONDERING WHY THEY ARE INVOLVED IN THESE ADVERTISING CAMPAIGNS AND WHY, IF THE CONGLOMERATES ARE SO GOOD FOR THE COUNTRY, HAVE WE FACED INCREASING ECONOMIC AND PRODUCTIVITY PROBLEMS DURING THE PERIOD OF THEIR INCREASING DOMINANCE?

I UNDERSTAND THAT THE JUSTICE DEPARTMENT, THE FEDERAL TRADE COMMISSION, AND THIS COMMITTEE, ARE CONSIDERING LEGISLATION DESIGNED TO PLACE LIMITS ON FUTURE CONGLOMERATE MERGERS AND ACQUISITIONS. I AGREE WITH PLACING LIMITS ON FUTURE CONGLOMERATION. I DO NOT AGREE THAT THIS WOULD BE ENOUGH HOWEVER. THERE MUST ALSO BE ADDITIONAL CONTROLS PLACED ON EXISTING CONGLOMERATES. SPECIFICALLY, I RECOMMEND THAT LEGISLATION BE PASSED TO ACHIEVE THE FOLLOWING:

- MAKE CORPORATIONS RESPONSIBLE FOR THE ACTIONS AND OBLIGATIONS OF THEIR SUBSIDIARIES. CUSTOMERS SHOULD HAVE LEGAL RECOURSE AGAINST THE PARENT COMPANY FOR THE OBLIGATIONS AND LEGAL COMMITMENTS OF ITS SUBSIDIARIES. THIS LIABILITY SHOULD APPLY TO ANY COMPANY WHICH HAS A CONTROLLING INTEREST IN ANOTHER.
- MAKE MANAGERS OF CONGLOMERATES AND OTHER CORPORATIONS LEGALLY RESPONSIBLE FOR ANY ILLEGAL ACTS INVOLVING THEIR COMPANIES, INCLUDING THOSE OF SUBORDINATES, IF THOSE OFFICIALS KNEW OR SHOULD HAVE KNOWN OF THESE ACTS.
- ESTABLISH EFFECTIVE GOVERNMENT CONTROLS OVER THE INVOLVEMENT OF LARGE CORPORATIONS IN INTERNATIONAL AFFAIRS.
- PROHIBIT ALL ACQUISITIONS AND MERGERS BY COMPANIES WITH MORE THAN $100 MILLION IN SALES OR TOTAL ASSETS, OR WHICH WOULD RESULT IN A COMBINED COMPANY WITH SALES OR TOTAL ASSETS OF OVER $100 MILLION, UNLESS IT COULD BE DEMONSTRATED TO THE SATISFACTION OF BOTH THE ATTORNEY GENERAL AND THE CHAIRMAN OF THE FEDERAL TRADE COMMISSION THAT SUCH MERGER OR ACQUISITION WOULD HAVE THE PREPONDERANT EFFECT OF ENHANCING COMPETITION.

ALTHOUGH I HAVE BEEN CRITICAL OF SOME CURRENT TRENDS IN BUSINESS, I AM NOT HOSTILE TO BUSINESS. I BELIEVE IN FREE ENTERPRISE AND THE CAPITALIST SYSTEM. NO OTHER SYSTEM OFFERS AS MUCH OPPORTUNITY FOR INDIVIDUAL FREEDOM AND ACCOMPLISHMENT.

Theodore Roosevelt was this nation's foremost proponent of rugged individualism, and a strong advocate of business. But he sensed the growing cynicism among ordinary citizens toward a government that permitted one law to exist for powerful corporations and another for individual citizens. He recognized that corporate lawlessness undermined the very foundation of democracy and it was in this sense that he engaged in his famous battles with the "malefactors of great wealth."

Businessmen complain that overregulation by Government inhibits their freedom and accomplishments, yet it is the very acts of some of them that have made the regulation necessary. Adolf Berle made the perceptive observation that when business threatens to engulf the state, it forces the state to engulf business.

What I have recommended today is not the engulfment of business by the state. Rather it is recognition that unless we act now to relieve some of the tensions, the commercial institutions themselves will be jeopardized. The public may appear apathetic to the rapid growth of the large conglomerates. But few are in the position to fully appreciate their impact.

Therefore, it is up to Congress to take the initiative. If Congress truly wants to safeguard our free enterprise system, it will have to take steps to curtail the increasing concentration of money and power in the hands of the few who control the conglomerates.

THIS SPEECH REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

THURSDAY, JUNE 18, 1970

ACCOUNTING PRACTICES - DO THEY PROTECT THE PUBLIC?

by

Vice Admiral H. G. Rickover, U.S. Navy
at the
Federal Government Accountants Association
19th Annual National Symposium
Carillon Hotel, Miami Beach, Florida
Thursday, June 18, 1970

I welcome the opportunity to address your Association.

I have some definite views related to the theme of your Symposium "Prologue to Progress: Let the public service be a proud and lively career," especially as it applies to the federal accountant.

It is my view that the accountant, particularly the federal accountant, must accept a greater responsibility for the public well-being.

I am a Naval Officer and an engineer, not an accountant. My interest in accounting stems from my experience in managing technical programs for the Atomic Energy Commission and the Department of Defense, and from personal concern as an interested citizen. It also stems from the fact that the funds I am given are limited and must be expended as economically as possible or we will have fewer ships to protect our country. Added to this is my knowledge, based on much experience, that without the active help of accountants, I cannot do my job efficiently.

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For over 20 years I have been responsible for designing, procuring, constructing and maintaining the nuclear plants in our nuclear-powered warships. I was also responsible for the design and construction of the Shippingport Atomic Power Station, the first full-scale central station nuclear power plant in the United States. Managing civilian and military programs has afforded me a unique opportunity to assess the contributions as well as the deficiencies of federal accounting, particularly as they relate to government dealings with industry.

Professional societies in all disciplines must, I believe, be more active in looking out for the public interest. A year ago I made this same point in an address to the American Society for Metals. I questioned whether industrial safety codes developed by private industry associations were adequate to prevent injury to the public health and well-being. I asked, "Who protects the public?" The same question applies here. Who protects the public in accounting matters?

Today our nation faces many difficult problems. Our cities are crowded and run-down. We are using up our natural resources at a prodigious rate. We have polluted our water supply and the air we breathe. The ecological balance is threatened.

The ever-increasing concentration of economic power in giant corporations threatens our competitive economic structure. In a number of basic items, our industrial society is no longer competitive in world markets. Balance of payments deficits are a recurrent worry. Many of our institutions have grown so large, they are almost unmanageable. For example, the Department of Defense today is larger than the entire federal government was in 1939, and federal employment has tripled since then. Inflation and cost overruns are plaguing military programs. The public has lost confidence in military procurement. The words "economy in Government" have lost significance.

Can the federal government accountants solve all of these problems? Obviously not. But the point I want to make is that you could make a greater contribution than you have in the past.

I am encouraged that your agenda includes panel discussions on three topics relating to current problems in defense procurement: uniform cost accounting standards, implementation of the Truth-in-Negotiations Act, and profits on defense contracts. The problems in each of these areas relate directly to your professional accounting responsibilities as well as your responsibilities to the public.

The role of the federal government has expanded over the years. Today the government affects the economic climate in which almost every industry operates. It regulates banking, communications, broadcasting, transportation, and utilities. It subsidizes farming, shipping, airlines, large and small business. It spends $60 billion a year through government contracts. It collects over $200 billion a year in income taxes, social security taxes, excise taxes, and so forth. It greatly influences education, health and welfare, scientific research and development--every aspect of national life.

The growth of large industrial and financial corporations has paralleled the growth of the federal government. Years ago, the typical business unit was a small, local establishment with a single owner. But for the past one hundred years, the history of industrial development in the United States is largely the story of the growth of large corporations. The advantages of the corporation as an instrumentality for the conduct of business in a free enterprise system have resulted in its phenomenal growth in the United States. The reality is that a new economic order is emerging, characterized by large industrial organizations that maintain a partnership between themselves and government.

It may be that in this rapidly spiraling scientific and technological age this is the best way to marshal our resources, both for national security and for optimum economic use of resources and manpower. If this is so, a great responsibility rests on all of us to see that these giant organizations do not become, in effect, a fourth branch of government--a fourth branch, but without the accountability to the public that is the distinguishing mark of a democracy.

For if the tendency of the federal bureaucracy to make accommodations with industrial corporations is not properly controlled, we will, in effect, have a fourth branch of government, where men exert power without political responsibility. This constitutes a threat to our democratic society and makes it imperative that the federal accountant do his job properly, since it is his responsibility to make relevant facts visible and to show the financial consequences of management actions. It is therefore essential that accounting be accurate in a total sense—that it be meticulous in portraying facts as they are, not as someone wants them to be. Lord

Kelvin once said:

> "When you measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind."

It is the accountant's job to insure that the relevant facts are expressed in the right numbers.

As our nation has grown, this role of the accountant, both in government and out, becomes more and more important to the public and to those responsible for the management and supervision of our large industrial and governmental institutions.

Government, the public, and industry management look to the accountant for objective reports. They want differences in accounting figures to reflect real differences. They want timely and responsive reports containing reliable information so that they may be able to judge efficiency. This cannot be achieved unless there are definitive rules and standards for reporting costs.

The difference between operating with and without definitive accounting rules is like the difference between a man who has fallen into the water and a man who is bathing--both have to swim, but one does it frantically from necessity and the other deliberately from choice.

It is the responsibility of accountants,and particularly of federal accountants, to establish proper standards. In my opinion the federal accountants have not, as a group, met their public responsibility in this regard. Consider first the current situation in defense contracting. The

Department of Defense spent over $40 billion for military procurement in 1969. Of this amount, about $4 billion was spent in formally advertised, competitive contracts and the remainder, $ 36 billion, in negotiated procurements--procurements which are not truly competitive. Of the $36 billion in negotiated procurement, $24 billion was spent under sole-source contracts; $12 billion in contracts involving only limited competition among two or sometimes three bidders.

Under these circumstances supplier costs are bound to be the primary consideration in determining contract prices. The government is,however, compelled to rely almost entirely on the contractor's estimates and cost records for data to determine the reasonableness of the prices he demands.

I find that it is virtually impossible, without spending months reconstructing each supplier's books, to discover what it really costs to manufacture defense equipment or how much profit contractors actually make in producing it. The problem is the extreme variability of accounting practices--the lack of uniform standards. Costs on some contracts are not considered as costs on other contracts. Contractors price contracts under one accounting system, yet charge their costs under a different accounting system. On most defense contracts there is no requirement that the contractor keep meaningful cost records. In these circumstances, it becomes virtually impossible to determine true costs.

I first raised the issue of cost accounting standards for defense contracts before Congress in 1963. Each year thereafter I testified before Congressional committees about the serious need for such standards. Finally, in 1968, the House of Representatives passed a bill requiring the development of uniform cost accounting standards for defense contracts. Even at that late date the accounting profession gave little heed to the problem.

In the 1968 Senate hearings on the House Bill, the Department of Defense claimed that adequate standards already existed. The General Accounting Office hedged and attempted to side-step the issue. The American Institute of Certified Public Accountants opposed the bill. Financial executives of company after company in the defense industry went on record against the bill.

In all the accounting profession, only Mr. J. S. Seidman of Seidman and Seidman, Certified Public Accountants, testified to the serious need for cost accounting standards. The federal government accountants were conspicuous by their silence. As a result, the bill that emerged from Congress in 1968 required only that the General Accounting Office study the matter.

After studying it, the GAO agreed that uniform cost accounting standards are both feasible and necessary. Mr. Staats, the Comptroller General, in testimony before the Senate Banking and Currency Committee, stated that he believed uniform cost accounting standards would result in a substantial saving of public funds. My own estimate is about $2 billion a year.

Industry, of course, strongly opposes uniform cost accounting standards. It is lobbying to weaken, frustrate, or if possible kill uniform cost accounting legislation. To hear industry tell it, uniform cost accounting standards would be a tragedy.

To paraphrase Oscar Wilde's famous quip about the death of Little Nell in Dickens' Old Curiosity Shop a man would have to have a heart of stone to read their stories without laughing. Industry naturally does not like uniform cost accounting standards. It would like to continue the system whereby it can nationalize its losses and privatize its gains.

To date this lobbying has been effective, aided to a considerable degree by the reluctance of federal accountants, particularly the General Accounting Office, to take the initiative in establishing such standards. Several years ago, the General Accounting Office testified to Congress that someone other than they should conduct the study of uniform accounting standards. Ultimately, Congress had to direct it to make the study.

Now the study is complete and the need for uniform cost accounting standards well established. However, the GAO--legally the most authoritative accounting group in government--has once more testified that some group other than itself should be given the job of setting these standards.

That office took a similar position when the Joint Economic Committee asked it to study defense profits. The Comptroller General said it was not his job; someone else should do it--someone outside government--or industry might not cooperate.

One excuse given by the GAO in backing away from sensitive issues has been that it lacks the legislative authority to do the job. Yet its charter is extremely broad. Here is an extract:

"The Comptroller General shall investigate at the seat of Government

> or elsewhere, all matters relating to the receipt, disbursement, and application of public funds, and shall make to the President when requested by him and to Congress at the beginning of each regular session, a report in writing of the work of the General Accounting Office, containing recommendations concerning the legislation he may deem necessary to facilitate the prompt and accurate rendition and settlement of accounts and concerning such other matters relating to the receipt, disbursement, and application of public funds as he may think advisable. In such regular report, or in a special report at any time when Congress is in session, he shall make recommendations looking to greater economy or efficiency in public expenditures."

Moreover, the Budget and Accounting Procedures Act of 1950 states:

> "The Comptroller General *** shall prescribe the principles, standards, and related requirements for accounting to be observed by each executive agency ***"

With such charters, the General Accounting Office has adequate authority to get into virtually all aspects of government operations. The office could, in a sense, become the conscience of our government; it could also become a center of excellence, a locus of discontent. However, it has waited for others to take the lead in these fundamental issues.

This characteristic is not peculiar to the General Accounting Office alone. I see it in the conduct of other groups of federal accountants as well. So in considering the matter of uniform cost accounting standards, the question keeps occuring to me: Where have the federal accountants been all these years? Why haven't they raised the issue long ago? Whose job is it to see that adequate accounting standards exist to protect public funds? Is it among the duties of a naval officer? Is it the job of Congress?

Take another area—renegotiation of government contracts.

Renegotiation as it is presently carried out cannot be effective. Because of exemptions in the law, large blocks of defense work are not even covered by renegotiation. Moreover, the Renegotiation Board uses Internal Revenue Service accounting rules for cost and profit determinations. Any accountant knows that Internal Revenue Service rules were not designed for cost accounting and that they are inadequate for the purpose. The apparent standard is no standard at all. Industry can report, for renegotiation purposes, almost whatever profit it chooses.

Time and again I find that cost and profit figures reported by contractors differ substantially from the figures found subsequently by government audit. Yet the Board accepts these industry reports at face value, without even auditing them. Its staff has been kept so small that the Board, even had it wanted to, could not have closely checked contractor reports.

Thus, we have the semblance but not the substance of effective renegotiation. Uniform cost accounting standards are fundamental to making renegotiation an effective process. The public does not understand this. Nor are most members of Congress fully aware of this need.

Imagine what would happen if the Internal Revenue Service started accepting tax returns at face value. The tax collection system would not be effective or equitable. Yet the Renegotiation Board has been accepting renegotiation statements at face value for years.

There are other loopholes in the renegotiation process. For example, the Renegotiation Act permits a contractor to average profits over all his business. The growth of conglomerates in recent years has made this a significant loophole. In 1951, when the Renegotiation Act was passed, most of the Navy's major private shipbuilders were independent companies devoted chiefly to shipbuilding, and with their own corporate managements. They had to file profit statements on their shipbuilding activities with the Renegotiation Board. But today, most of these shipbuilders have become divisions or subsidiaries of giant conglomerates. Electric Boat Company is now a division of General Dynamics Corporation; Ingalls Shipbuilding Company a division of Litton Industries; Puget Sound Bridge & Dry Dock Company a division of Lockheed Aircraft Company; Avondale Shipyard a division of Ogden Corporation; and the Navy's largest private shipbuilder, Newport News Shipbuilding and Dry Dock Company, has now been taken over by Tenneco.

Consequently the Renegotiation Board no longer gets a direct look at the profits earned by the Navy's shipbuilders. The Board may review the defense profit of the conglomerate, but that figure merely reflects the total profit on all its defense contracts. The government has effectively lost its ability to check against excessive profits on shipbuilding contracts.

The rules established for renegotiation in 1951 are simply not adequate today. We must have accurate financial reports to make the system work. I should think federal accountants would be deeply concerned with this problem since it so deeply affects the public interest.

Other areas of government activity besides renegotiation have been adversely affected by the trend toward large conglomerates.

These continuing mergers of large corporations present a number of problems in connection with their defense work. Besides having to pay the normal operating costs of the division actually performing government work, the government now has additionally to pay a tax in the form of a corporate general and administrative expense rate levied by the parent company on its division--hence on the government. Therefore, the cost of government work goes up. It is not clear to me what value the government gets for the additional cost. I am involved in one case where the major portion of the general and administrative tax levied on government work consists of interest expense on the debt incurred by the conglomerate in acquiring the company.

These mergers tend to result in what might be called "pooling of inefficiencies". My experience is that conglomerate managements generally do not much concern themselves with improving efficiency of the companies they acquire. Rather, they concentrate most of their efforts in seeking ways to eke out more cash or profits from the business. Much effort goes into looking at ways to reduce the company's investment in facilities and inventories, even if this results in higher operating costs. Since most defense procurement is non-competitive, defense contractors are usually able to pass these higher operating costs directly onto the government. Under Department of Defense rules for determining profit as percentage of costs, the higher the operating costs, the higher the profits.

Another problem concerns depreciation costs. Suppose Company A has a plant making defense equipment. Company A is then merged into a conglomerate. The government, in the price of its contracts, has absorbed much of Company A's depreciation expense. However, under current accounting rules for acquisitions by purchase, the conglomerate may revalue Company A's fixed assets to a new higher value—a so-called "fair market value"—as part of the merger. Company A is then able to write off on government contracts more than it paid originally for the plant. It can charge the government higher depreciation costs for the very same plant, even though the only "improvement" is a new name over the door.

Conglomerate mergers have been thriving for over 20 years, aided by loose accounting rules and practices. The question is whether these loose rules and practices are in the public interest. Today two companies may merge without any recognition of a gain or loss in the transaction—even if there is a large gain for one of the companies. I understand that the Accounting Principles Board will be meeting in the near future to consider new standards to restrict certain aspects of accounting for mergers, but the situation has been allowed to go on far too long.

There are other illustrations indicating that you, as federal government accountants, have been dilatory in facing up to problems affecting the public interest.

Recently, I read that banks, unlike other industries, have not been required to show losses on loans--or gains and losses on security transactions--in their net income figures. So for years banks have reported income figures higher or lower than their actual income.

The Federal Trade Commission, to put it mildly, has been slow in facing up to the issue of whether companies should be required to report costs and profits by product lines. The Securities and Exchange Commission--although it has extensive statutory authority over security issuers' accounting methods--has been less than avid in requiring conglomerates to report profit and other financial information regarding the operations of major divisions or subsidiaries. The Interstate Commerce Commission has also managed to avoid getting involved in these disagreeable matters. In 1960, it ruled that public statements had to conform to a uniform system of accounts. But two years later, the Commission rescinded this rule and authorized carriers to issue public statements based on "generally accepted accounting principles."

In all these cases federal agencies and federal accountants could have been more effective in making certain that the public gets relevant and adequate financial information.

The Truth-in-Negotiations Act is another case where federal government accountants have not been adequately protecting the public. You have scheduled a panel discussion on the subject. I hope you will consider two major points: First, what positive action will your organization take to promote full compliance with the spirit and the letter of the Act?

Second, why have the federal government accountants stood by in silence during the eight years the Truth-in-Negotiations Act has not been complied with?

The Act was passed in 1962. It has not yet been fully implemented. For example, I found recently that our major shipbuilders had not yet carried out its provisions. Steel companies, the forging industry, the computer industry, and other material suppliers all refuse to provide the cost and pricing data required by the Act. These are merely the industries where I have had first hand experience. I understand there are others that ignore the Truth-in-Negotiations Act.

Since your own membership would not raise these issues, I decided to do so myself. I investigated and reported that our shipyards were not complying with the Truth-in-Negotiations Act; I reported that cost and pricing data are not being obtained from steel manufacturers. In the past year I referred four specific sole-source forging procurements to higher authority for resolution because none of the four suppliers involved would comply with the requirements of the Truth-in-Negotiations Act.

The refusal of industries and companies to comply with the Act is common knowledge among people working in the field. I am sure the examples I have given come as no surprise to you.

Defense procurement officials, however, profess ignorance. They have officially stated that they are unaware of any serious problem in implementing the Truth-in-Negotiations Act. Apparently federal accountants have not been reporting problems encountered in implementing the Act.

Congress has been led to believe that the Truth-in-Negotiations Act has been an effective safeguard against overcharging. In truth, however, in the case of a large number of favored companies and industries, it is not being applied at all.

I believe that federal accountants should be playing a major role in settling the long standing controversy over profits on defense contracts. The issue is simple: the Defense Department pays out billions of dollars each year in profits to defense contractors. My experience has been that in many cases defense profits are too high; that in the public interest we should know exactly how much profit each contractor makes on his defense work.

On the other hand, the Department of Defense and industry contend that defense profits are low. Yet they will not set up a profit reporting system that would reveal factual data on defense profits.

Instead they have tried to assuage public concern with estimates of defense profits based on questionnaires, surveys, stockholder reports, volunteered information, Renegotiation Board data, and the like. Studies by the Logistics Management Institute--studies financed by the Department of Defense--have been the most publicized of these estimates.

These estimates are then used to support the Defense Department and industry position that on the average, defense profits are low. Any accountant however recognizes the hazards of averages. I am reminded of the six-foot tall traveler who had been told that the river he was about to cross had an average depth of three feet. He drowned, a victim of averages.

The public, members of Congress, and government officials receiving these profit studies tend to accept the information at face value, not understanding how easy it is to conceal serious problems in averages and that, in the absence of definitive accounting standards, contractors can report whatever profit figures will suit their purpose. The fact is that no one in government knows how much profit is actually being made on defense contracts.

In case after case you will find companies changing their accounting system, or changing asset valuation, or changing their method of depreciation to show a different overall profit figure. They have great flexibility in deciding how to assign costs and profits between defense and non-defense work. No one ever checks the details. Such checks would be of limited value anyway because of the absence of definitive accounting standards.

Just a week ago, a large conglomerate--one of the nation's largest defense contractors--announced that the company was considering changes to its 1969 financial statements. The company stated:

> "These [changes] include some accounting entries involving a change to an expense basis of accounting in one division, which became a charge to income of $10 million, and another change in the reserve for depreciation of another division, which became a credit of $13 million, and other miscellaneous items."

This shows the flexibility they have in accounting matters.

Mr. Peter Drucker, the management expert, stated the issue succinctly when he said: "Far too few management scientists...realize that practically every single definition of accounting is based on assumptions of high metaphysical content--and that any accountant worth his salt can convert any profit figure into a loss figure, or vice versa, if given control of the accounting definitions, all unquestionably within the limits of the proper accounting practice."

All of you no doubt recognize the problem. But is it not your professional responsibility to make government and the public aware of it?

There is another aspect to the question of profits on defense contracts. Industry's accepted criterion for profitability is return on investment. But the defense procurement regulation is based on computing profit as a percentage of cost.

The effect of this regulation is to discourage efficiency. Since competition in the defense industry is limited, contractors who increase their efficiency may, in the long run, actually lose profit under the present system. If it costs $100 to do a job and the prevailing profit paid under Department of Defense guidelines is 10 percent, the contractor will get $10 profit every time he does that job. If he cuts his costs to $90, he will get only $9 profit in the future. Thus, contractors get higher profits in the long run by keeping costs up. So they have little incentive to invest in facilities and in new machine tools which could make defense work more efficient and less costly. There is instead a strong incentive to maintain minimum investment with the highest possible cost base for determining profit.

This is a problem apparent to federal government accountants. I believe you have a duty to make it known to the government and the public.

In case after case I observe federal accountants letting others take the lead in the very area where you should have been pioneers protecting the public. Take the issue of uniform cost accounting standards which is neither new nor revolutionary. This concept has existed in Continental Europe for years.

In the early 1920's the German professor Eugene Schmalenbach was frustrated by his inability to make accurate comparisons of the financial data made available by different companies. His Model Chart of Accounts laid the foundation for the subsequent development of uniform accounting in Germany and in other European countries.

Today, uniform plans of accounts are used in Germany for more than 100 applications. These plans range from simple classifications for individual proprietorships and tradesmen to complex uniform plans of accounting for large industrial enterprises. In France, the official General Accounting Plan has been mandatory since 1947 for publicly owned enterprises and for firms receiving government subsidies. Other European countries have similar plans. Yet in our country the notion of uniform accounting standards has been viewed by accountants, including federal accountants, as an heretical idea.

Accountants in this country have been slow to face up to other aspects of their public responsibility as well. Until 40 years ago they recognized no legal or professional responsibility to anyone other than the immediate client. The 1931 court decision in the case of Ultramares Corp. v. Touche, Niven & Co. upheld this point of view A creditor, relying on an accountant's certification of the corporation's financial statements, lent money to a small corporation. The corporation went bankrupt within a few months. The creditor then sued the accountant, arguing that he had relied on the accountant's certification. Judge Cardozo ruled that the accountant was not liable to the creditor. He said that, except in cases of actual fraud, an accountant had no legal duty except to the person who hired him or to a third party, if the accountant knew at the time of the certification that the third party would rely on the certification. Of this decision Lord Justice Denning said: "I think it is to be regretted, for it means that the accountant's certification, which could be a safeguard, becomes a snare for those who rely on it."

While the courts held to this precedent for 25 years, the 1933 law establishing the Securities and Exchange Commission gave the government broad powers over security issues, accounting methods, and public disclosure of financial information.

The accounting profession, too, began to consider its professional responsibility. In 1938 the American Institute of Accountants established a Committee on Accounting Procedure, forerunner of the present Accounting Principles Board. The Committee was, however, largely ineffectual. In the 21 years of its existance it published 51 research bulletins recommending acceptable procedures. According to one analysis:

> "The Bulletins tended to present ad hoc solutions to unrelated specific problems and frequently recognized the acceptability of two or more procedures for accounting for identical transactions occurring under identical circumstances. Furthermore, the Bulletins presented recommendations only; with the exception of the six rules

adopted by the AICPA membership vote, the conclusions contained in the Bulletins were not binding on the Institute membership. Accordingly, procedures not embraced in the Bulletins might also be considered to be 'generally accepted'."

Meanwhile, the idea of increasing the scope of responsibility of public accountants was growing in legal and financial circles. A series of judicial decisions in the 1960's in effect overturned the Ultramares decision. Thus, in the Yale Express case, an accounting firm, Peat, Marwick, and Mitchell, discovered that figures previously certified in annual reports were false and misleading. But they waited more than a year before they informed the Securities and Exchange Commission and the investing public of the falsity of the certified report. In a suit against the accounting firm by a group of investors and creditors, a federal court ruled that the firm could be held liable to investors and lenders even though it had no contractual relationship with these investors and had received no financial benefit from the nondisclosure.

In Rusch Factors Inc., v. Levin, the court held that an accountant was liable for his "professional malpractice" to any third party who might foreseeably rely on the accountant's certification.

In recent years more than 100 similiar suits have been filed, all based on the concept of the public accountant's public responsibility. These cases involve some of the largest and most prestigious firms in the profession. Ernst & Ernst faces a number of suits concerning allegedly misleading financial statements about the Westec Corporation; and two partners of Lybrand, Ross Brothers and Montgomery were fined for their role in certifying Continental Vending Machine Corporation's financial statements. The firm of Peat, Marwick, and Mitchell was also held liable for inaccuracies in the prospectus of BarChris Construction Company.

Mr. Leonard Spacek, chairman of Arthur Andersen and Company, is one of the few public accountants who have recognized this issue of public responsibility. He said:

> "The accounting profession hasn't recognized the fact that public ownership exists. The profession still labors under the impression that it is working for entrepreneurs who know all the details about their companies--the accountants have thought little about what the public investor wants to know."

Clearly the courts now recognize--even though most members of the accounting profession may not--that accountants have a broad general responsibility, not only to their clients but to the public as well. But too often, loyalty to an employer takes precedence over the public interest.

The essential service of the accounting profession is to sort out and direct attention to relevant facts regarding performance. The nature of federal government accounting work carries you to the very heart of all aspects of our government's operations. You are in a unique position to seek out fundamental deficiencies in the conduct of public business and to promote reform. This, moreover, is your primary responsibility, both as individuals and as a professional association.

The idea of individual responsibility is paramount. Time and again in my work I have seen improper and wasteful practices by contractors go uncorrected because the responsible government officials did not see to it that government work was performed properly. These officials limit their activities to the narrow confines of their job descriptions, ignoring many basic deficiencies not literally spelled out as matters for which they are responsible. After a while deficient practices become accepted as a way of life. As Alexander Pope said:

> "Familiar with her face,
> We first endure,
> Then pity, then embrace."

Inevitably when I look into these deficiencies I find that it is not a question of an insufficiency of government personnel, or inadequacy of government salaries. Rather, I find the deficiencies are prevalent because government officials will not accept the responsibility to look after the government's interests in the broad sense of the term. They become instead a sort of bystander, an observer duly recording what the contractor chooses to show him. Whether he is an accountant, lawyer, engineer, or military professional, the principal duty of a government official is to protect the government--and thus the American public--financially, legally, and technically.

Responsibility is a unique concept. It can only reside and inhere in a single individual. You may share it with others, but your portion is not diminished. You may delegate it, but it is still with you. You may disclaim it, but you cannot divest yourself of it. Even if you do not recognize it or admit its presence you cannot escape it. If responsibility is rightfully yours, no evasion, or ignorance, or passing the blame can shift the burden to someone else.

I have been criticized because I, a Naval Officer, have intruded into accounting matters. My answer is that as long as accountants neglect their own responsibilities, to the detriment of mine, I will continue to intrude. It is my responsibility to do so. When an institution does not do its job, a vacuum is created and some outsider always has to step in and fill the vacuum.

If you as federal accountants desire to be considered professionals, you must earn the title by your attitude and by your actions. One does not become a professional simply by getting a degree. Professionalism requires one to maintain constant awareness and consciousness of all matters affecting his area of compentence; it also requires continued application of one's capabilities to advance his chosen field.

Nor does a society of accountants become a professional group merely by holding meetings and symposia. It is the application of the total effort of the group to correction of specific problems and to advancement of the field as a whole in the public interest; it is acceptance of the duties such a responsibility entails that is the distinguishing characteristic of a true professional society.

Contractors, industry associations, Washington lawyers--all exert tremendous pressure on legislators and government officials to loosen the constraints of laws, regulations, and policies governing their conduct. Federal government accountants must become the counterpoise.

By failing to work for rules and standards of accounting protecting the public, your profession has in my opinion neglected its public responsibilities. For, in the absence of such standards, industry has been free to use accounting flexibility to its own advantage and to the disadvantage of the public. Moreover, because the profession has been laggard in promoting authoritative standards, accounting issues are being decided by boards, by courts, and by industry--instead of by accountants.

I want to make it clear that in speaking so frankly, I do so with no derogatory intent. I am reminded of the old Indian prayer: "Great Spirit, grant that I may not criticize my neighbor until I have walked a mile in his moccasins." My comments reflect my experience of nearly half a century in government service. If I speak critically, I do so because I believe that a complex industrial society such as ours cannot be conducted efficiently and for the public good unless there is a group such as yours that is qualified for and faithfully carries out its duties. Only by informed criticism can our society be improved; only so improved can it survive.

I believe that as federal accountants you have a responsibility to take the lead in accounting matters affecting the federal government. You cannot simply leave it to the American Institute of Certified Public Accountants; their actions have shown them to be incapable of resolving these issues.

Moreover, I do not think you can expect the public accountants hired by industry to establish proper cost accounting standards for defense contracts. Despite their best effort at objectivity and professionalism, they must represent industry, since they are paid by industry. Unless they represent industry, their services will not be retained. "Whose bread I eat, his song I sing." I am not sure just how much you can count on a firm's objectivity when its financial benefit depends on its business with a company that has a vested interest in the accountant's report.

In contrast, the clear duty of the federal accountant is to the public. If the Federal Government Accountants Association is to be more than a social club, it must assume a greater role in looking after the public interest in all accounting and auditing matters affecting public funds or public well-being.

I suggest that your Association give consideration to adopting a creed similar to the one formulated by Hippocrates for the medical profession some 24 centuries ago. That oath has stood the test of time. As I see it, your responsibility as members of a profession rather than a business is to bring out the truth in an area where the Government, and hence the American public, must deal with manipulation of facts. You have the expertise which the public lacks to cut through these manipulations to the truth and to make it known.

THIS SPEECH REFLECTS THE VIEWS
OF THE AUTHOR AND DOES NOT
NECESSARILY REFLECT THE VIEWS
OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

FOR RELEASE 8:00 P.M. (EST)
FRIDAY, MARCH 30, 1979

LAWYERS VERSUS SOCIETY

BY
ADMIRAL H. G. RICKOVER, USN
BEFORE THE
NEW YORK PATENT LAW ASSOCIATION, INC.
NEW YORK, N.Y.
MARCH 30, 1979

SEVERAL WEEKS AFTER I AGREED TO ADDRESS THIS GROUP, OFFICIALS OF YOUR ASSOCIATION BEGAN EXPRESSING INTEREST IN THE TOPIC OF MY SPEECH. THEY URGED ME TO TALK ABOUT MY CAREER, NATIONAL DEFENSE, HISTORY, PHILOSOPHY, MY PERCEPTION OF THE FUTURE--ANYTHING BUT PATENTS. THEY SAID FEDERAL JUDGES AND CORPORATE EXECUTIVES WOULD BE PRESENT AND THAT THE MEMBERS AND GUESTS WOULD WANT TO ENJOY THEMSELVES.

I DO NOT HAVE THE SLIGHTEST INTEREST IN PROVIDING ENTERTAINMENT FOR DINNER PARTIES OR FOR ANYONE ELSE. I HAVE ALWAYS LIVED, AMONG OTHER RULES, BY THE ONE "HEAVEN IS BLEST WITH PERFECT REST, BUT THE BLESSING OF EARTH IS HONEST TOIL." MY SOLE REASON FOR COMING HERE IS TO IMPRESS UPON YOU THE NEED AND IMPORTANCE FOR THE LEGAL PROFESSION TO START PLAYING A TRULY RESPONSIBLE ROLE IN OUR SOCIETY.

IN THE LEGAL COMMUNITY AND ELSEWHERE, THE PEDESTAL OF PROFESSIONALISM IS NOW SHAKY. ABUSES OF POWER BY BUSINESSMEN, ACCOUNTANTS, DOCTORS, AND LAWYERS--MAKE IT OBVIOUS THAT SOMETHING IS WRONG. INSTEAD OF WORKING FOR THE BENEFIT OF SOCIETY, MANY PROFESSIONALS SEEM TO BE WORKING FOR THE BENEFIT OF A FEW OR FOR THEMSELVES. PROFESSIONAL ORGANIZATIONS APPEAR UNABLE OR UNWILLING TO POLICE THEIR MEMBERS. PUBLIC CONFIDENCE IN THEM HAS DECLINED. ALTHOUGH OTHER PROFESSIONS ARE ALSO AT FAULT, LAWYERS ARE THE BRUNT OF THE CRITICISM.

IT HAS BEEN MY EXPERIENCE THAT MEMBERS OF THE LEGAL PROFESSION ARE CONTRIBUTING SUBSTANTIALLY TO THE EROSION OF VALUES AND INSTITUTIONS ON WHICH OUR SOCIETY IS BASED. IN THEIR QUEST FOR MONEY AND POWER MANY LAWYERS SEEM TO HAVE FORGOTTEN THEIR OBLIGATIONS.. BY SO DOING, THEY ALIENATE THEIR COUNTRYMEN; BREED DISTRUST OF OUR INSTITUTIONS AND THOSE WHO RUN THEM; AND UNDERMINE THE TRADITIONAL VALUES OF HONOR, HUMILITY, AND HONEST DEALING.

THE PROBLEM STEMS LARGELY FROM THE GROWING OBSESSION WITH MONEY IN OUR SOCIETY. PREOCCUPATION WITH PROFIT CREATES INCENTIVES AND PRESSURES ON INDIVIDUALS TO ACT IN WAYS THEY WOULD NOT OTHERWISE CONSIDER.

LAWYERS ARE SUPPOSED TO BE OFFICERS OF THE COURT; IT IS TO THEM THAT SOCIETY HAS ENTRUSTED THE ADMINISTRATION OF JUSTICE. THE AMERICAN PEOPLE EXPECT OUR SO-CALLED OFFICERS OF THE COURT TO BE MORE THAN MERCENARIES. YET IN PURSUIT OF THEIR OWN INTERESTS, MANY LAWYERS HAVE LOST SIGHT OF THE PUBLIC GOOD.

INSTEAD OF HOLDING BACK THE ATTACK ON OUR INSTITUTIONS AND VALUES, MANY HAVE INSTEAD LED IT.

THERE HAS BEEN A BREACH OF FAITH BY LAWYERS--AND THE PUBLIC KNOWS IT. A RECENT NATIONAL POLL FOUND THEM RANKED BELOW GARBAGE COLLECTORS IN PUBLIC ESTEEM AND THAT BUT A SMALL PART OF THE PUBLIC HAS CONFIDENCE IN LAW FIRMS. THE CHIEF JUSTICE OF THE SUPREME COURT RECENTLY CONCLUDED THAT A MAJORITY OF LAWYERS PRACTICING IN COURT ARE NOT PROPERLY EQUIPPED TO DO SO. THE PRESIDENT HIMSELF HAS STATED PUBLICLY THAT WE ARE "OVER-LAWYERED AND UNDER-REPRESENTED." A FOREIGN OFFICIAL HAS COMMENTED: "YOU HAVE LAWYERS LIKE OTHER PEOPLE HAVE MICE."

IT IS ARGUED THAT OUR ADVERSARY SYSTEM OF LAW DEMANDS THAT ATTORNEYS LITIGATE VIGOROUSLY, REGARDLESS OF THE MERITS OF THEIR CLIENT'S CASE. THIS VIEW HAS BECOME A RATIONALIZATION FOR PRACTICING THE LAW IN A WAY THAT FREQUENTLY OFFENDS JUSTICE AND DEBASES THE INTEGRITY OF OUR JUDICIAL SYSTEM. TOO OFTEN THE FINANCES, PATIENCE, AND TIME AVAILABLE TO A LITIGANT HAVE BECOME MORE IMPORTANT TO THE OUTCOME OF A CASE THAN ITS LEGAL MERITS. LAWYERS SHOULD INSTEAD STRIVE TO FOCUS THE COURT'S ATTENTION ON THE LEGAL OR FACTUAL ISSUES IN DISPUTE QUICKLY AND EFFICIENTLY. BUT MANY OF THEM DO THE OPPOSITE. LAW PRACTICED IN THIS MANNER DOES NOT AIM TO RECONCILE THE PARTIES AND RESOLVE THE DISPUTES. IT STRIVES TO BENEFIT THOSE WHO HAVE THE RESOURCES TO DOMINATE THE COURT BY DISTRACTING IT.

ONE OF THE MOST FRUSTRATING AND WASTEFUL PRACTICES IN SOCIETY TODAY, AND ONE THAT CONTRIBUTES MOST TO THE BREAKDOWN IN OUR SYSTEM OF JUSTICE, IS THE DELIBERATE OBFUSCATION OF ISSUES BY LAWYERS. FACED WITH A WEAK CASE, MANY SEEK TO

REDIRECT ATTENTION TO IRRELEVANT MATTERS AND TECHNICALITIES. BY SO DOING THEY CAN DELAY OR ALTOGETHER AVOID UNFAVORABLE DECISIONS ON THE LEGAL MERITS OF A CASE.

ALTHOUGH COMPLAINTS ABOUT DELAYS IN THE JUDICIAL PROCESS ARE WIDESPREAD AND OFTEN DISCUSSED IN LEGAL CIRCLES, I WONDER HOW MANY LAWYERS EVEN CARE, OR HAVE A REALISTIC APPRECIATION OF THE DETRIMENTAL EFFECTS FRIVOLOUS LITIGATION, LEGAL MANEUVERING, MASSIVE DISCOVERY CAMPAIGNS, AND DELAYING TACTICS HAVE, NOT ONLY ON THE JUDICIAL PROCESS, BUT ON OTHER WORTHWHILE HUMAN ENDEAVORS. CAUGHT UP IN THE HEAT OF THEIR LEGAL BATTLES, AND WITH AN EYE TOWARDS THE REWARDS, MANY LAWYERS SEEM INDIFFERENT TO THE EFFECT THEIR LITIGATIVE TACTICS HAVE ON THEIR VICTIMS.

I HAVE HAD FIRST HAND EXPERIENCE WITH THESE EFFECTS AND I DOUBT THEY ARE UNIQUE. I AM RESPONSIBLE FOR THE DESIGN, CONSTRUCTION, AND SAFE OPERATION OF 152 OPERATING NUCLEAR REACTORS IN NAVAL SHIPS AND ASHORE--MORE THAN THE TOTAL OF ALL OTHER OPERATING COMMERCIAL REACTORS IN THE U.S. TODAY. LIKE MANY OTHER PROJECTS IN GOVERNMENT AND INDUSTRY, THIS WORK REQUIRES METICULOUS ATTENTION TO DETAIL AND LONG HOURS BY MANY DEDICATED PEOPLE. EVERY YEAR IT BECOMES HARDER AND HARDER FOR THEM TO DO A PROPER JOB. THEIR EFFORTS AND ATTENTION MUST INCREASINGLY BE REDIRECTED TO EXTRANEOUS MATTERS. IN THIS RESPECT, THE LEGAL PROFESSION IS MAKING A GREAT NEGATIVE CONTRIBUTION TO OUR DEFENSE.

AS ONE MINOR EXAMPLE, FIFTEEN YEARS AGO, THE GENERAL ACCOUNTING OFFICE REPORTED THAT A LARGE DEFENSE CONTRACTOR HAD OVERCHARGED THE GOVERNMENT $500,000 ON ONE OF MY CONTRACTS. LAST DECEMBER THE ISSUE FINALLY CAME TO TRIAL. I EXPECT A

RULING IN ABOUT A YEAR. THE ISSUE IS SIMPLE. YET THE LAWYERS REPRESENTING THE CONTRACTOR HAVE MANAGED TO DRAG IT OUT. MEANTIME, THEIR CLIENT HAS USE OF THE MONEY IN DISPUTE.

IN ANOTHER CASE, A LARGE CONGLOMERATE REFUSED TO HONOR ITS CONTRACT, CONTENDING IT WAS INVALID AND SHOULD BE REPRICED. FOUR YEARS OF MASSIVE DISCOVERY AND LEGAL MANEUVERING HAVE NOW ELAPSED, AND VALIDITY OF THE CONTRACT HAS YET TO BE TRIED IN COURT. MEANWHILE, THE TIME OF MANY KEY NAVY PERSONNEL IS DIVERTED FROM THEIR PRIMARY DUTIES.

IN THIS CASE I HAVE BEEN SUBJECT TO MORE THAN 40 HOURS OF DETAILED INTERROGATION UNDER THE GUISE OF DISCOVERY BY A TEAM OF EXPERIENCED LAWYERS OVER A PERIOD OF SEVERAL WEEKS. HAD THEY BEEN INTERESTED ONLY IN GATHERING INFORMATION ABOUT THE CASE, THEY COULD HAVE COMPLETED THE QUESTIONING IN ONE TO TWO HOURS. OF COURSE, THE LONGER THEY TAKE, THE MORE MONEY THESE HIGH-PRICED LAWYERS MAKE. A FEW DAYS AGO, I RECEIVED WORD THAT THE LAWYERS WANT TO RESUME MY DEPOSITION.

HOW IS THE COMMON GOOD SERVED WHEN LAWYERS OBFUSCATE ISSUES, DELAY AND HARASS THE OPPOSITION, AND ATTEMPT TO ABROGATE CONTRACTS? HOW IS JUSTICE SERVED BY FRUSTRATING THE LEGAL INSTITUTIONS AND PROCEDURES THAT HAVE BEEN ESTABLISHED AND ARE AVAILABLE TO THE PUBLIC FOR RESOLUTION OF DISPUTES? EVEN WHEN BOTH PARTIES CAN AFFORD THE LEGAL COSTS, THE DELAY AND HARASSMENT NOW TYPICALLY INVOLVED IN LITIGATION MAKE IT INCREASINGLY UNATTRACTIVE TO ALL EXCEPT THE LAWYERS. MOREOVER, THROUGH DELAY, ONE PARTY CAN EFFECTIVELY DENY HIS ADVERSARY'S RIGHT TO A JUDICIAL DETERMINATION.

LAST SUMMER, THE SECRETARY OF THE NAVY DECIDED TO GRANT THE NAVY'S THREE LARGEST SHIPBUILDERS EXTRA-CONTRACTUAL RELIEF

TOTALING MORE THAN $500 MILLION UNDER A SPECIAL LAW CONGRESS HAD ENACTED TO COVER EXTRAORDINARY ACTIONS DETERMINED TO BE NECESSARY TO FACILITATE THE NATIONAL DEFENSE. THE SECRETARY SAID THAT NOT GRANTING SUCH RELIEF WOULD INEVITABLY MEAN LONG YEARS OF LITIGATION AND A DISRUPTIVE RELATIONSHIP WHICH WOULD UNREASONABLY JEOPARDIZE THE NATIONAL DEFENSE.

LARGE CONTRACTORS AND THEIR WELL-PAID LAW FIRMS HAVE THUS MADE LITIGATION UNPALATABLE AND DIFFICULT FOR THEIR ADVERSARIES. IN SUCH A CLIMATE THE CONCEPT OF JUSTICE IS LOST; VICTORY WILL USUALLY GO TO THOSE IN THE STRONGEST NEGOTIATING POSITION.

THE TACTICS OF DELAY AND OBFUSCATION WHICH SERVE SOME LAWYERS WELL IN COURT HAVE NOW PERMEATED THE GOVERNMENT PROCUREMENT PROCESS. BY DRAGGING OUT DISPUTES, LAW FIRMS MAKE IT POSSIBLE FOR THEIR CLIENTS TO DEFER OR PERHAPS AVOID REPORTING LARGE LOSSES TO STOCKHOLDERS. SEVERAL LARGE SHIPBUILDERS WERE FOR MANY YEARS ABLE TO AVOID REPORTING SUCH LOSSES, SIMPLY BY PREDICTING OPTIMISTIC RECOVERIES FROM PENDING LITIGATION, AND THE LONGER A CASE DRAGS ON, THE GREATER THE LIKELIHOOD OF GOVERNMENT PEOPLE LEAVING FOR OTHER JOBS, MEMORIES FADING, AND THE CASE BEING FINALLY SETTLED INDEPENDENT OF THE LEGAL MERITS.

THERE ARE NOW LAW FIRMS WHICH SPECIALIZE IN OMNIBUS CLAIMS AGAINST THE GOVERNMENT. THESE CLAIMS HAVE DISTINGUISHING CHARACTERISTICS. THEY OFTEN GO FROM TENS TO HUNDREDS OF MILLIONS OF DOLLARS. THEY ARE GROSSLY INFLATED, SO THAT SETTLEMENT AT A FRACTION OF THE CLAIM WILL STILL YIELD THE DESIRED AMOUNT. THEY ARE BASED ON UNSUBSTANTIATED ALLEGATIONS THAT THE GOVERNMENT IS AT FAULT. THEY DO NOT SHOW A CAUSE AND EFFECT RELATIONSHIP BETWEEN ALLEGED GOVERNMENT RESPONSIBLE ACTIONS AND THE AMOUNT CLAIMED.

SOME DRAW AN ANALOGY WITH OTHER TYPES OF LITIGATION, SUCH AS PERSONAL INJURY SUITS WHERE A LAWYER MIGHT ASK FOR $1 MILLION IN DAMAGES IN THE HOPE OF RECOVERING $25,000. IN SUCH CASES, NO ONE TAKES THE INITIAL AMOUNT SERIOUSLY. THE JUDGE OR JURY ARRIVES AT A FIGURE INDEPENDENTLY, BASED ON THE TESTIMONY OF WITNESSES.

BUT CONTRACT CLAIMS AGAINST THE GOVERNMENT ARE DIFFERENT. SINCE PUBLIC FUNDS ARE AT STAKE, EVERY ELEMENT OF THESE CLAIMS MUST BE SCRUTINIZED FOR LEGAL ENTITLEMENT AND THE COST AUDITED AND EVALUATED. LARGE CLAIMS OF THIS SORT TIE UP MANY KEY PEOPLE FOR MANY YEARS WHO MUST EVALUATE THE VALID AND INVALID PORTIONS OF THE CLAIM. THOSE ON WHOM THE GOVERNMENT MUST RELY FOR CLAIMS ANALYSES ARE THE VERY ONES WHO ARE ALSO RESPONSIBLE FOR OTHER ON-GOING WORK.

ONE CONGLOMERATE SUBMITTED CLAIMS TOTALING ABOUT $1 BILLION AGAINST THE NAVY. THE CLAIMS COMPRISED 64 VOLUMES, EACH TWO INCHES THICK, AND COVERED MANY YEARS OF PERFORMANCE UNDER VARIOUS CONTRACTS.

GOVERNMENT TEAMS UNDER THE DIRECTION OF A SPECIAL INDEPENDENT BOARD REQUIRED A YEAR AND A HALF TO EVALUATE THESE CLAIMS. THEY WERE EVENTUALLY SETTLED FOR LESS THAN ONE-FOURTH THE AMOUNT CLAIMED. TO JUSTIFY EVEN THIS FIGURE, THE GOVERNMENT HAD TO INCLUDE LARGE SUMS TO COVER LITIGATIVE RISK AND LITIGATIVE COST--THAT IS, THE LIKELIHOOD OF UNFAVORABLE DECISIONS BY A COURT, AND THE ESTIMATED COST FOR THE GOVERNMENT TO SPEND YEARS LITIGATING.

ABUSE OF THE DISCOVERY PROCESS, HARASSMENT, OBFUSCATION, AND DELAY ARE NOT PRACTICES UNIQUE TO CLAIMS LAWYERS.

WIDE RANGING INTERROGATORIES AND EXTENSIVE DISCOVERY REQUESTS HAVE BECOME A STANDARD LEGAL TACTIC. I UNDERSTAND SOME LAW FIRMS HAVE THOUSANDS OF QUESTIONS STORED IN COMPUTERS, AVAILABLE AT THE PRESS OF A BUTTON. THUS, EVEN THE LIMITS OF AN ATTORNEY'S IMAGINATION OR TIME NEED NO LONGER BE A CONSTRAINT ON THE MISCHIEF HE CAN CAUSE.

ANOTHER EXAMPLE OF LAWYER MISCHIEF INVOLVES THE FREEDOM OF INFORMATION ACT. THE ACT WAS DESIGNED TO ENSURE PUBLIC ACCESS TO GOVERNMENT INFORMATION.

NOW, LAW FIRMS ARE USING IT TO CONDUCT, IN EFFECT, UNILATERAL DISCOVERY PROCEEDINGS IN DISPUTES WITH THE GOVERNMENT, AND AT TIMES WHEN THE LATTER HAS NO COMPARABLE RIGHT TO THE CORPORATE DATA. THE LAW FIRMS ARE ABLE TO USE THE ACT TO GIVE THEIR CLIENTS AN UNFAIR ADVANTAGE OVER THE GOVERNMENT IN LITIGATION.

SOME LAW FIRMS TRY TO OBTAIN FOR THEIR CLIENTS, THROUGH THE FREEDOM OF INFORMATION ACT, INFORMATION THEY COULD NOT OTHERWISE GET ABOUT THEIR COMMERCIAL COMPETITORS, SUCH AS LABOR AND OVERHEAD RATES, ESTIMATING PRACTICES, AND SO ON--INFORMATION THAT IS FURNISHED TO THE GOVERNMENT IN THE PROCUREMENT PROCESS.

IN SUCH INSTANCES, THE GOVERNMENT OFTEN ENDS UP IN THE MIDDLE. UNDER THE FREEDOM OF INFORMATION ACT, GOVERNMENT EMPLOYEES CAN BE DISCIPLINED FOR IMPROPERLY WITHHOLDING SUCH

INFORMATION. YET UNDER ANOTHER STATUTE, THEY CAN BE FINED AND IMPRISONED FOR RELEASING A COMPANY'S PROPRIETARY DATA. ONE COMPANY SUES THE GOVERNMENT TO DISCLOSE DATA ABOUT A COMPETITOR; THE COMPETITOR THEN SUES TO FORBID ITS RELEASE. THIS IS AN EXAMPLE OF THE CHAOS PRODUCED BY THE FERTILE MINDS OF OUR LAWYERS. IT IS ALSO AN EXAMPLE OF THE ADVANTAGE LAWYERS ARE TAKING OF THE SYSTEM TO PROMOTE THE INTERESTS OF THEIR CLIENTS--AND THEMSELVES. I DOUBT THAT THOSE WHO ENACTED THE FREEDOM OF INFORMATION ACT ENVISIONED THE USES TO WHICH IT HAS BEEN PUT BY LAWYERS.

THE PATENT LAWYERS HERE TONIGHT MAY HAVE BEEN WONDERING WHY SO FAR I HAVE NOT ALLUDED TO THEM. YET PATENT LAWYERS EXHIBIT THE SAME TENDENCIES THAT PERVADE OTHER SEGMENTS OF THE PROFESSION. THEY TOO ARE SKILLED IN THE TACTICS OF OBFUSCATION AND DELAY. MOREOVER, I BELIEVE THAT MANY PATENT LAWYERS DO HARM TO THE ECONOMY AND TO THE CREDIBILITY OF THE PATENT SYSTEM. FREQUENTLY THEY REPRESENT THE NARROW ECONOMIC INTERESTS OF THEIR CLIENTS, TO THE DETRIMENT OF THE PUBLIC, BY USING SUCH TACTICS AS INDISCRIMINATE PATENTING OF MINOR DESIGN DETAILS.

MEMBERS OF THE PATENT BAR, WHILE PURPORTING TO BE LOOKING OUT FOR THE PUBLIC INTEREST, FREQUENTLY PROMOTE CONCEPTS WHICH FAVOR THEIR LARGE CLIENTS. THE DOGMA OF THE PATENT LAWYERS IS CONTRADICTORY. ON THE ONE HAND, THEY CONTEND THAT GOVERNMENT CONTRACTORS SHOULD GET EXCLUSIVE RIGHTS TO INVENTIONS DEVELOPED AT GOVERNMENT EXPENSE. YET RARELY, IF EVER, HAVE I HEARD PATENT LAWYERS CRITICIZE THESE CONTRACTORS FOR REQUIRING THEIR EMPLOYEES TO GIVE UP ALL RIGHTS TO INVENTIONS DEVELOPED AT CONTRACTOR EXPENSE.

THE PATENT LOBBY SPEAKS ELOQUENTLY OF FREEDOM, THE FREE ENTERPRISE SYSTEM, AND COMPETITION, IN CONNECTION WITH PATENT ISSUES. IN PRACTICE, HOWEVER, THEY HELP LARGE COMPANIES FENCE OUT COMPETITION BY BLANKETING FIELDS OF TECHNOLOGY WITH PATENTS AND PATENT APPLICATIONS ON IDEAS AND ITEMS NOT WORTHY OF A PATENT. SMALL FIRMS THAT CANNOT AFFORD THE DELAY AND COST OF INFRINGEMENT LITIGATION DO NOT ENTER THE MARKET.

THE PATENT LOBBY IS ACTIVELY PROMOTING THE CONCEPT THAT THE GOVERNMENT SHOULD PROVIDE BUSINESSMEN GREATER INCENTIVES TO INVEST IN TECHNOLOGY IN ORDER TO COMBAT A PERCEIVED DECLINE IN THIS COUNTRY'S TECHNOLOGICAL GROWTH. THE RECOMMENDED INCENTIVES TAKE THE FORM OF INCREASED GOVERNMENT SPENDING FOR RESEARCH AND DEVELOPMENT AND GRANTING CONTRACTORS EXCLUSIVE RIGHTS TO PATENTS DEVELOPED AT GOVERNMENT EXPENSE.

I AM NOT CONVINCED THAT THERE IS ACTUALLY A DECLINE IN TECHNOLOGY OR THAT THE INFUSION OF GOVERNMENT FUNDS WOULD BE AN APPROPRIATE SOLUTION. IN ANY EVENT, SHOULD THE GOVERNMENT SPEND MORE, LARGE COMPANIES WILL PROBABLY GET THE LION'S SHARE OF THE INCREASE--AS THEY ALWAYS DO.

PATENT LAWYERS WELL KNOW THAT INCREASED GOVERNMENT RESEARCH AND DEVELOPMENT SPENDING AND GIVING GOVERNMENT CONTRACTORS EXCLUSIVE RIGHTS TO GOVERNMENT FINANCED INVENTIONS, WILL PROMOTE GREATER CONCENTRATION OF ECONOMIC POWER IN LARGE CONGLOMERATES, AND AT PUBLIC EXPENSE. SUPPOSE, WITH VAST SUMS OF GOVERNMENT MONEY, A LARGE COMPANY MAKES A MAJOR DISCOVERY IN ENERGY.

WHAT WOULD AN ORDINARY TAXPAYER THINK IF THAT COMPANY COULD, FOR 17 YEARS, LEGALLY CONTROL THE DISSEMINATION, USE, AND PRICING OF THIS INVENTION? YET THIS IS WHAT THE PATENT LOBBY ADVOCATES.

MOST PROFESSIONS HAVE A GROUP THAT SETS STANDARDS OF CONDUCT FOR ITS MEMBERS, AND IS SUPPOSED TO DISCIPLINE TRANSGRESSORS--AN ORGANIZATION WHOSE CHARTER PLACES PROFESSIONALISM ABOVE MONEY CONSIDERATIONS. IN THE LEGAL COMMUNITY, THIS GROUP IS THE AMERICAN BAR ASSOCIATION.

UNFORTUNATELY, THIS ORGANIZATION SEEMS TO BE FURTHER UNDERMINING RESPECT FOR THE LEGAL PROFESSION. BY RESPONDING WITH A COUNTER ATTACK TO THOUGHTFUL CRITICISM BY OUR PRESIDENT AND OUR CHIEF JUSTICE, THE ABA SHOWED IT IS MORE INTERESTED IN PRESERVING ITS CUSTOMS, THAN IN BEING A PROFESSIONAL ORGANIZATION. PERHAPS IT SHOULD BE RENAMED THE AMERICAN BAR PROTECTIVE ASSOCIATION, OR ABPA.

THE ABA'S DISCIPLINARY PROCEDURES ARE WIDELY RECOGNIZED AS A TOKEN EFFORT, WITH DISBARMENT RESERVED PRIMARILY FOR THE RARE MEMBER WHO IS OCCASIONALLY CONVICTED OF A FELONY. EVEN WHERE MISCONDUCT IS FOUND, PUNISHMENTS ARE OFTEN LIGHT. A PENNSYLVANIA ATTORNEY, FOUND GUILTY OF EMBEZZLING $10,000 FROM A CLIENT'S INHERITANCE, WAS MERELY SUSPENDED FROM THE ABA. A NEW YORK ATTORNEY REFUSED TO ALLOW HIS CLIENT TO BE BROUGHT TO TRIAL UNTIL HIS FEE HAD BEEN PAID. HE THEN DEDUCTED THE FEE FROM THE BAIL MONEY, WHICH HE INTERCEPTED. THE ABA CALLED THE INCIDENT A MERE FEE DISPUTE AND TOOK NO DISCIPLINARY ACTION.

THE ABA HAS DONE NOTHING TO SOLVE THE REVOLVING DOOR PROBLEM--WHERE LAWYERS GET EXPERIENCE IN GOVERNMENT, AND THEN JOIN PRIVATE FIRMS WHICH REPRESENT CLIENTS AGAINST THEIR FORMER GOVERNMENT AGENCY. ONE WASHINGTON LAW FIRM THAT SPECIALIZES IN CLAIMS AGAINST THE NAVY IS HEADED BY A FORMER NAVY GENERAL COUNSEL. ANOTHER SUCH FIRM WAS HEADED BY A FORMER MEMBER OF THE DEFENSE DEPARTMENT'S ARMED SERVICES BOARD OF CONTRACT APPEALS. AND ONLY LAST MONTH THE CHAIRMAN OF THIS VERY SAME BOARD RESIGNED TO BECOME A PARTNER IN THIS VERY SAME FIRM. THERE HE WILL JOIN AN EX-NAVY DEPUTY COUNSEL WHO WAS RESPONSIBLE FOR DEFENDING THE GOVERNMENT AGAINST SHIPBUILDING CLAIMS.

SEVERAL MONTHS AGO, THE WALL STREET JOURNAL CARRIED AN ADVERTISEMENT BY A FORMER NAVY ATTORNEY WHO TOUTED HIS EXPERIENCE WITH CLAIMS WHILE EMPLOYED BY THE NAVY. HE SOLICITED CLIENTS WHO DESIRED TO SUBMIT CLAIMS AGAINST THE GOVERNMENT. DESPITE YEARS OF DEBATING THIS SUBJECT, THE LEGAL PROFESSION AND THE ABA HAVE YET TO ENFORCE THEIR OWN RULES AGAINST LAWYERS SWITCHING SIDES.

THE ABA OFTEN OPERATES MORE LIKE A TRADE ASSOCIATION THAN A PROFESSIONAL SOCIETY. FOR EXAMPLE, ITS PUBLIC CONTRACT LAW SECTION REPRESENTS THE ASSOCIATION IN MATTERS RELATING TO GOVERNMENT PROCUREMENT, YET IT HAS BECOME A FRONT FOR THE CLAIMS LAWYERS WHO DOMINATE ITS MEMBERSHIP AND ACTIONS.

LAST YEAR, THE ABA WAS ACTIVELY LOBBYING CONGRESS IN FAVOR OF A BILL GOVERNING DISPUTES UNDER GOVERNMENT CONTRACTS. THE VIEWS OF THIS ORGANIZATION CARRY GREAT WEIGHT IN SUCH ARCANE SUBJECTS.

BURIED IN THEIR PROPOSED LEGISLATION WERE NUMEROUS LOOPHOLES, ALL OF WHICH FAVORED CLAIMS LAWYERS AND THEIR CONGLOMERATE CLIENTS. FOR EXAMPLE, THE BILL SET A DOUBLE STANDARD WHICH INVARIABLY WORKED AGAINST THE GOVERNMENT, ALSO, AGENCIES WOULD, FOR THE FIRST TIME, BE GIVEN AUTHORITY TO HORSE-TRADE CLAIM SETTLEMENTS WITHOUT REGARD TO THEIR LEGAL MERITS. BUT THIS WAS NOT CLEARLY SPELLED OUT IN THEIR PROPOSAL; IT WOULD BE APPARENT ONLY TO THOSE WELL VERSED IN THE CLAIMS BUSINESS.

I POINTED THIS OUT IN CONGRESSIONAL TESTIMONY, AND THE BILL WAS CHANGED TO ELIMINATE THESE LOOPHOLES. IN ADDITION, THE BILL WAS MODIFIED TO REQUIRE CERTIFICATION OF CLAIMS AND TO PROVIDE STIFF PENALTIES FOR SUBMISSION OF FALSE CLAIMS. AS YOU MAY BY NOW SURMISE, THE ABA DID NOT ENDORSE THESE MODIFICATIONS.

LATER I LEARNED THAT THE ABA LOBBYISTS WHO WORKED ON THIS BILL WERE SENIOR PARTNERS OF PROMINENT, CLAIMS ORIENTED LAW FIRMS. CLAIMS LAWYERS, LIKE OTHER CITIZENS, ARE ENTITLED TO LOBBY MEMBERS OF CONGRESS IN THEIR OWN BEHALF. BUT FOR THEM TO DO SO BY USING THE AMERICAN BAR ASSOCIATION AS THE UMBRELLA DEGRADES THE ENTIRE PROFESSION. WHY DOES THE ABA TOLERATE SUCH ACTIONS TAKEN IN ITS NAME?

TODAY, OUR NATION FACES IMPORTANT PROBLEMS OF UNPRECEDENTED DIFFICULTY--DECLINING ENERGY RESERVES, THE ECONOMY, THE ENVIRONMENT, FOREIGN AFFAIRS, SLOWING PRODUCTIVITY GROWTH. FACED WITH THESE PROBLEMS WE CANNOT AFFORD SO MANY WHO, IN THE PURSUIT OF MONEY, EXACERBATE THE DIFFICULTIES OF THESE PROBLEMS.

LAWYERS OCCUPY KEY POSITIONS AND EXERT GREAT INFLUENCE IN OUR SOCIETY. MANY OTHER CITIZENS, ALSO SEEKING SUCCESS, EMULATE THEM. IS THE EXAMPLE BEING SET BY MANY IN THE LEGAL PROFESSION OF BENEFIT TO OUR SOCIETY, OR IS IT HARMFUL? WHAT HAPPENS TO TRADITIONAL VALUES WHEN SIGNED CONTRACTS ARE BROKEN WITH NO MORAL STIGMA ATTACHED TO THOSE WHO BREAK THEM; WHEN PEOPLE ARE DRIVEN, UNDER THREAT OF LITIGATION, TO PAY SUMS THEY MAY NOT OWE; WHEN THOSE SKILLED IN THWARTING JUSTICE ARE CONSIDERED SUCCESSFUL MEN?

I DO NOT MEAN TO INDICT ALL LAWYERS. MANY DEDICATED ONES SERVE IN GOVERNMENT, ON THE BENCH, AND IN PRIVATE PRACTICE. NEVERTHELESS, THE PRACTICE OF LAW IS TODAY REPLETE WITH PROBLEMS THAT DEMAND CORRECTION. AND LAWYERS ARE THE ONES WHO MUST DO THE JOB.

I HAVE SOME SPECIFIC RECOMMENDATIONS:

1. TAKE STEPS TO DISCOURAGE FRIVOLOUS LITIGATION. IN THIS REGARD, THE PRESENT REQUIREMENTS TO CERTIFY PLEADINGS IN CIVIL LITIGATION NEEDS STRENGTHENING--THESE REQUIREMENTS ARE FULL OF LOOPHOLES, AND ARE NO DETERRENT TO THOSE WHO WOULD BRING FRIVOLOUS CHARGES BEFORE THE COURTS. CRIMINAL PENALTIES SHOULD BE ESTABLISHED AND STRICTLY ENFORCED FOR ATTORNEYS WHO CERTIFY PLEADINGS THEY KNOW OR HAVE REASON TO KNOW ARE FALSE.
2. ESTABLISH WITHIN THE LEGAL COMMUNITY A TRULY PROFESSIONAL FORUM FOR DEALING WITH THE PROBLEMS OF LAW AND JUSTICE--A FORUM THAT WOULD PLACE PROFESSIONAL RESPONSIBILITY ABOVE COMMERCIAL

CONSIDERATIONS; EFFECTIVELY DISCIPLINE MEMBERS; AND RECOMMEND WAYS OF REDUCING LITIGATION AND STREAMLINING JUDICIAL PROCEDURES.

JUDGES AND OTHERS RESPONSIBLE FOR THE ADMINISTRATION OF JUSTICE SHOULD ACT MORE FIRMLY THAN THEY NOW DO IN POLICING OUR COURTS. SOME JUDGES SEEM TO EQUATE JUSTICE WITH ENSURING THAT EACH SIDE TAKES AS MUCH TIME AS IT WISHES TO MAKE ITS CASE. WHERE WOULD WE BE IF THE SUPREME COURT OPERATED ON THAT BASIS?

A FREE SOCIETY CANNOT EXIST UNLESS THE PUBLIC HAS CONFIDENCE THAT JUSTICE THROUGH THE LEGAL SYSTEM IS AVAILABLE EQUALLY TO ALL; THAT COURTS CAN AND WILL DELIVER JUSTICE IN A TIMELY MANNER WHICH PEOPLE OF ORDINARY MEANS CAN AFFORD; AND THAT LAWYERS, AS OFFICERS OF THE COURT, ARE MEN OF INTEGRITY, WELL TRAINED, AND DEDICATED TO RESOLVING DIFFERENCES IN SOCIETY FAIRLY. FURTHER, THE RESPONSIBILITY MUST REST WITH EACH MEMBER OF THE BAR.

RESPONSIBILITY IS A UNIQUE CONCEPT: IT CAN ONLY RESIDE AND INHERE IN A SINGLE INDIVIDUAL. YOU MAY SHARE IT WITH OTHERS, BUT IT IS STILL WITH YOU. EVEN IF YOU DO NOT RECOGNIZE IT OR ADMIT ITS PRESENCE, YOU CANNOT ESCAPE IT. IF RESPONSIBILITY IS RIGHTFULLY OURS, NO EVASION, OR IGNORANCE, OR PASSING THE BLAME CAN SHIFT THE BURDEN TO SOMEONE ELSE.

AT ALL LEVELS OF OUR SOCIETY, THERE IS TODAY MUCH TALK OF RIGHTS AND TOO LITTLE OF DUTIES. HERE IS A GREAT OPPORTUNITY FOR LAWYERS, FOR MEN WHO HAVE BENEFITED GREATLY FROM THE LAW AND FROM A BENIGN AND BOUNTEOUS LAND. HERE IS

THE OPPORTUNITY TO CONTRIBUTE SOMETHING IN RETURN.

THE FREEDOM AND PRIVILEGE YOU PRESENTLY ENJOY WILL NOT LAST, NOR WILL IT BE AVAILABLE TO FUTURE GENERATIONS, UNLESS YOU DO SO; UNLESS YOU ACT AS RESPONSIBLE PROFESSIONALS AND CITIZENS; UNLESS YOU TREAT THOSE WHO ACT IRRESPONSIBLY AS THEY DESERVE TO BE TREATED.

IN COMING HERE I FEEL A BIT LIKE EURYSTHEUS OF GREEK MYTHOLOGY. THE AUGEAN STABLES HOUSED THREE THOUSAND OXEN AND HAD NOT BEEN CLEANED FOR THIRTY YEARS. EURYSTHEUS DID NOT HAVE THE WHEREWITHAL TO CLEAN THE STABLES HIMSELF. BUT HE DID POINT OUT THE PROBLEM TO HERCULES, WHO CLEANED THEM BY DIVERTING TWO RIVERS.

IN SIMILAR VEIN, I CAN ONLY HOPE THAT SOME OF YOU WILL TAKE ON THE HERCULEAN TASK OF CLEANSING THE LEGAL PROFESSION. THIS IS WELL WORTH THE EFFORT, EVEN IF YOU HAVE TO DROWN A FEW OXEN IN THE PROCESS.

THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY.

STATEMENT OF
ADMIRAL H. G. RICKOVER, U. S. NAVY
TO THE
MONOPOLY SUBCOMMITTEE
OF THE
SENATE SMALL BUSINESS COMMITTEE
ON
DECEMBER 19, 1977

GOVERNMENT PATENT POLICY

Thank you for inviting me to testify. For the past thirty years I have been responsible for the research, development, procurement, production, operation, and maintenance of the nuclear propulsion plants in U.S. Navy warships. During World War II, I was responsible for the design, procurement, and operation of the Navy's shipboard electrical equipment. My comments today with respect to Government patent policy are, therefore, based on extensive dealings with various segments of American industry for about forty years.

The basic presumption in most laws concerning Government patents is that the Government retains title to patents developed at public expense. But, today, many Government agencies routinely grant contractors exclusive rights to these patents. I do not believe this practice is in the public interest. It promotes greater concentration of economic power in the hands of large corporations; it impedes the development and dissemination of technology; it is costly to the taxpayer; and it hurts small business. In my view, the rights to inventions developed at public expense should be vested in the Government and made available for use by any U.S. citizen.

Under our patent laws, the holder of a patent enjoys a 17-year monopoly. During this time, he can prevent others from using the invention; he can license the invention and charge royalties; or he can manufacture and market the invention as a sole source supplier. If the invention is worthwhile, he is in a position to make exorbitant profits.

Patents are a survival of so-called letters patent which were issued in large numbers during the Middle Ages and through the Age of Mercantilism. These were open--hence the word "patent" --royal letters announcing to one and all that the possessor had been given exclusive rights by the monarch to some specified office, privilege, or commercial monopoly.

Originally, the purpose of letters patent granting industrial or trade monopolies was to promote the public interest; that is, to expand the nation's industry and trade--its national economy. It was then believed that the best, if not the only way, to induce people to invest large capital sums in new industries or trading ventures was to guarantee them freedom from competition, that is, to grant them a monopoly.

In time, the public interest came to be disregarded by monarchs. They granted letters patent to court favorites or sold them to the highest bidder in order to enrich themselves. In the reign of James I, the English Parliament finally put an end to the whole system of private monopolies and privileges through the 1624 Statute of Monopolies.

One type of letters patent was allowed to survive, the patent granted to inventors. For a limited time, a monopoly under the patent was allowed in order to encourage inventors to invest their brains, time, and money in research. It was believed that this was the best, if not the only, way to induce people to produce inventions. These basic ideas were subsequently incorporated into our own first patent law of 1790.

While there are flaws in our patent system, I can see why the Government grants patent protection to private interests who invest their own time and money in making inventions. But the patent situation today is quite different from what it was in 1790. At that time, a patent was a matter that concerned the individual primarily; individuals in a preindustrial age were developing single items. Today, the development of patents generally involves large organizations and corporations.

The U.S. Government alone is currently spending--in fiscal year 1978--nearly $26 billion for research and development. To grasp the significance of this sum, bear in mind that the total expenditures of the U.S. Government for the 11-year period, 1789 to 1800, was less than $6 million. It was not until 1917 that the entire Federal budget reached $1 billion.

Over the years I have frequently wondered whether, in this modern industrial age, patents are as important to industrial organizations as would appear from the statements made by the patent lawyers. It is probable that they are overemphasizing the present-day value of patents and it is quite possible our industry might not be hurt much if we restricted the items that could be patented.

I believe that today the important factor for an industrial organization is the know-how developed by it--the trade secrets and the techniques; these are not patentable qualities. They are things which are inherent in a company, in its methods; in its management and trained employees; in the kind of machine tools it has; how it uses these tools; and so on.

Up to the advent of the Atomic Energy Commission in 1946, and the Space Agency in 1958, most Government research and development consisted essentially of adaptations to existing technology. That is, an industrial organization would be called upon by the Government to take an item that it had already developed over a period of many years and modify it. But today, in many areas, the Government is in the forefront of technological development. As a result, it is actually the public that is financing development of entire new technologies. It is wrong, in my opinion, for the Government to grant a contractor exclusive rights for 17 years to inventions developed with public funds.

There are those, notably Government contractors, and patent lawyers in and out of Government, who have argued the opposite--that the Government should grant to contractors exclusive rights to publicly financed inventions. From what I have seen the patent lobby consists primarily of a body of shrewd, so-called experts who have been needlessly confusing the simple principles on which the patent law rests. They have been successful to the point that today many Government agencies are giving away Government patent rights.

The Department of Energy continues to operate under patent regulations which were inherited from the Energy Research and Development Administration (ERDA). The ERDA regulations are a good example of how the obvious intent of a Federal law can be stood on its head by a Government agency. ERDA's responsibilities were set forth in the Atomic Energy Act of 1954 and in the Non-Nuclear Energy Act of 1974. Both of these laws remain in effect and applicable to the Department of Energy.

Under the Atomic Energy Act, the Government, historically, retained patent rights to publicly-financed inventions. That also seemed to be the legislative intent behind enactment of the Non-Nuclear Energy Act of 1974. The Congressional Conference report for that Act, states:

> "Government patent policy carried out under the NASA and AEC Acts and regulations, and the Presidential Patent Policy statement with respect to energy

> technology, has resulted in relatively few waivers or exclusive licenses in comparison with the number of inventions involved. The conference committee expects that similar results will be obtained under Section 9 (of the Non-Nuclear Energy Act)."

However, under the Atomic Energy Act and the Non-Nuclear Energy Act, the Department of Energy has authority to waive the Government's patent rights. The Government patent lawyers have prepared a regulation which actually invites contractors to request waivers, and urges the agency to approve them. The regulation states:

> "...To accomplish its mission, ERDA must work in cooperation with industry in the development of new energy sources and in achieving the ultimate goal of widespread commercial use. ...An important incentive in commercializing technology is that provided by the patent system. As set forth in these Regulations, patent incentives, including ERDA's authority to waive the Government's patent rights to the extent provided for by statute, will be utilized in appropriate situations at the time of contracting to encourage industrial participation, foster commercial utilization and competition and make the benefits of ERDA's activities widely available to the public."

This regulation also states that each potential contractor should be notified at the time of bid solicitation that he may request the Government to waive its patent rights, and that a request for waiver will not be considered as an adverse factor in evaluating bids.

With these new regulations the number of waiver requests in the energy field has increased dramatically. In Fiscal Year 1975, the Energy Research and Development Administration reported receiving two waiver requests; in Fiscal Year 1976, the number increased to 106. No doubt the number will continue to grow geometrically as the patent lobby pushes this policy.

To the extent a Government agency is not bound to the contrary by the provisions of a statute, it is supposed to be guided by the Presidential patent policy memorandum issued by President Nixon in 1971. This policy memorandum attempts in broad terms to strike a middle ground between giving away and retaining Government patent rights. However, like most attempts to reconcile irreconcilable positions, it has failed. The wording is so broad and so vague that agencies can construe what they wish from the memorandum. The Department of Defense routinely gives patents away. The General Services Administration has published procurement regulations, for most other Government agencies, which do the same.

The patent lobby would have us believe that if companies are not guaranteed exclusive patent rights, they will not accept Government contracts. Obviously, if given a choice, most contractors would like the Government to give them exclusive rights to all patents that might result from Government contracts. But very few firms would, in my opinion and from my experience, reject Government business if they were not given patent rights.

These rights are not all that important to most firms The Atomic Energy Commission operated successfully for more than 25 years under a policy whereby the Government retained title to inventions developed under AEC contracts. That agency had little trouble finding contractors and did an excellent job of developing technology. Likewise, I have no trouble finding contractors even though they know they will not receive patent rights on my Nuclear Propulsion Program contracts.

From what I have seen, most of the people who actually run the companies are interested primarily in profits and in the technology, experience, and know-how that comes from performing the contracts. This technology, experience, and know-how is what helps the company get future Government and commercial contracts. Several studies, including a 1968 study by the Committee on Government Patent Policy, confirm that ownership of patents is usually not a major factor when companies decide what work to accept; that companies are interested primarily in how much money they can expect to make, and what they can learn.

Contractor lobby groups typically use the threat of refusing to take Government work when they try to persuade Congress to eliminate procurement safeguards or to take other actions that will benefit industry. The Defense contractor lobby, for example, has made similar threats year after year in relation to the Truth-in-Negotiations Act, the Cost Accounting Standards Board, the Renegotiation Board, and so on. They say that defense contractors will leave the business unless the Defense Department increases profits or relaxes regulations. Yet, year after year, these very same defense contractors lobby Congress and the Defense Department for more business. Their actions belie their words; and this is also the case with respect to patents.

While companies contend that they should have the right to the inventions they make at Government expense, they apply an exactly opposite principle in dealing with their own employees and subcontractors. Employees are required to give their employer the rights to any inventions that they conceive on the job. Toward their employees and subcontractors, the companies' practice is that the one who pays for an invention should own it. But in dealing with the Government, they contend that the one who actually made the invention should own it, not the one who paid for it. This is a classic example of "Heads, I win. Tails, you lose." It is also an example of the double-talk which has caused the public to hold business in such low esteem.

The patent lobby contends that contractors must be given exclusive patent rights to inventions developed under Government contracts or they will not invest in production facilities or in the future research and development work needed to commercialize an invention. This is one of the main arguments being used in promoting a giveaway patent policy.

It is nonsense to think that our technological growth will suffer unless contractors get exclusive rights to patents generated under Government contracts. From what I have seen over many years, the vast majority of patents both in and out of the nuclear industry are of little or no significance. Some individuals obtain patents as evidence of achievement, much as Boy Scouts collect merit badges. Their ideas might be patentable, but nothing worth pursuing.

Large corporations file numerous patents that are not great new developments, but minor improvements or design features. Often they file these patents simply to discourage competitors or potential competitors--particularly small firms--from trying to enter the market. And if someone wants to challenge the validity of any of these patents, it can take hundreds of thousands of dollars and years of litigation. A high percentage of patents contested in court are ruled invalid. But not many firms are willing or able to sustain such a challenge. Thus, these patents tend to discourage competition.

Obviously, there are patents that do represent useful ideas. However, even without a patent, many of these inventions would be discovered and adopted in the marketplace based on their merits. In such cases, rather than motivating individuals or companies to come up with new ideas, the patent system has actually become a process for determining which of many firms first conceived an idea, and is therefore entitled to the royalty. If one company did not generate the idea another firm would have because of the nature of the work being done. Often, identical ideas crop up almost simultaneously in different companies. Further, many good ideas can be implemented or "commercialized," without special investment in R&D or new facilities. Or, they are sufficiently promising that companies will invest in them without patent protection.

There may be a few inventions arising under Government contracts which, in the absence of exclusive patent rights given to the contractor, might not be disseminated and used. The question then arises: Is it really worthwhile for the Government to promote the invention? Perhaps the idea is not all that good. Moreover, if the Government should decide it is in the public interest to promote or "commercialize" a particular invention, it might be better if the Government itself paid for further development, and made the results available to all citizens instead of granting to one contractor exclusive rights to the invention. And who is to say, in cases where the Government patents are waived, that the company performing the contract should automatically and exclusively get these rights. Since large corporations get the major share of Government contracts, they would be the ones to benefit most from such a practice.

The concept of granting a patent--a legal monopoly--is to encourage inventors to conceive new inventions, not to guarantee a market for already existing inventions. But companies now want to have their marketing development costs guaranteed by having a patent monopoly on Government-financed inventions. Since the public has paid for the development of the invention, the risks of marketing it should be no different in principle from other risks that are inherent in a true free enterprise system. How is the risk of marketing a publicly-financed invention different from the risk a man takes when he opens a new grocery or hardware store on a corner where none existed before? We would be going still further in abandoning our so-called free competitive enterprise system if we guaranteed legal monopolies for what are essentially normal business risks.

The patent lobby contends that, under a giveaway patent policy, the public is protected because the Government would have "march-in" rights. Under this concept, contractors who have been given exclusive patent rights to inventions developed under Government contracts would be required to submit reports explaining their efforts to commercialize the inventions. If a contractor did not commercialize the invention to the Government's satisfaction, the Government would then exercise its "march-in" rights and take the patent rights back or license it to others.

This concept sounds good in principle. But, the patent lawyers well know that this is a cosmetic safeguard; it offers no real protection for the public. To administer such a program would require a large Government bureaucracy to receive, review, audit, and act upon contractor reports throughout the life of each patent. Currently, the Government would have to track contractor activity on about 30,000 unexpired patents. If the Government ever tried to reclaim its patent rights, more administrative effort, and probably much litigation would be involved.

In the real world, no one in Government would ever undertake this task; nor should they. Government agencies should concentrate on their proper functions rather than wasting time trying to keep track of how well contractors are promoting and commercializing patents.

It is relevant to note that, although Presidential patent policies since 1963 have required the Government to retain "march-in" rights where the principal or exclusive rights to a patent remain with the contractor, the Federal Council on Science and Technology reports that, as of December 1975, the Government has never exercised these rights.

The patent lawyers have observed that the number of patented inventions resulting from Federal funding is very small compared with the number generated by industry with their own funds. They attribute this, in part, to "the small incentive provided by present Federal patent policy."

I believe the lower number of inventions reported under Government contracts does not show a stifling of inventions under Government contracts. In fact, most of the major advancements in technology in the past 20 years have come in areas where the Government invested heavily, such as space, defense, and nuclear energy.

The lower number of Government-owned patents results from other factors, such as failure of contractors to report the inventions they develop under Government contracts; the patent rights giveaway policy followed by various Government agencies; and the Government's "Independent Research and Development" program.

I have found cases where contractors filed patent applications for themselves on items that were conceived and developed under Government contracts. These come to light only because, by law, patent applications in the field of atomic energy must be reviewed by the Department of Energy and because in my area I insist on having them reviewed. In areas outside the field of atomic energy, there is no way for Government agencies to determine whether contractors are claiming, as their own, patents which rightfully belong to the Government.

The relatively small number of Government patents stems from the very fact that the Government has been giving them away; they have been patented by the contractors. The Defense Department, for example, does not acquire patent rights under production contracts. It retains patent rights only under contracts characteracterized as "research." Even under R&D contracts, the Defense Department has criteria for giving away Government patent rights.

In my opinion, the Government's rights to patents developed at public expense should not depend on some arbitrary distinction between "research" and "production." Often the best ideas and technology come during manufacture of a product, rather than from the research and development work that preceded it. The Government should retain patent rights on Government contracts, regardless of the nature of the work, whenever the invention was developed at Government expense.

Another reason for the small number of Government patents is that contractors automatically get title to patents developed under the Government's so-called "Independent Research and Development" (IR&D) programs--even though all or nearly all of these costs are paid for by the Government. The Defense Department alone spends about $1 billion annually on this program, but the patents developed do not have to be reported to the Government.

Under present rules, any U.S. citizen, for a nominal fee, can get a non-exclusive license to use a Government-owned patent. There has been little demand for these non-exclusive licenses; but that does not mean the invention is not being used, as members of the patent lobby contend.

The reasons for the Government to patent its inventions are primarily defensive: to ensure that the Government is not subsequently barred by a private patent from using an invention whose development the Government itself paid for; to prevent the establishment of a private monopoly for an invention developed at Government expense; and to make the invention freely available to the public. If these same ends could be achieved by "defensive publication"--that is, by publishing information in a manner that would preclude others from patenting it--the public interest would be served as well as if the Government actually patented the invention.

This Committee will, I am sure, be lobbied to death by contractors and patent lawyers--both in and out of Government. There will be speeches extolling the virtues of a giveaway patent policy in relation to the patent system; the free enterprise system; the nation's declining technological growth; and the problems of small business. These are the standard speeches which lobbyists tailor to fit special occasions.

But here, the policy they advocate is contrary to the principles of free enterprise and competition. Rather than giving everyone in the marketplace equal access to publicly-financed inventions, they are advocating that the Government restrict the use of an invention to one company.

Small business, for its own advantage, should be against a giveaway patent policy. The vast proportion of Government business goes to large contractors. In Fiscal Year 1976, 50 percent of the total dollar value of research and development contracts placed by the Department of Defense went to only ten large corporations. In Fiscal Year 1977, two-thirds of the $35 - $40 billion defense procurement budget went to the top 100 contractors. As conglomerates expand, this concentration continues to increase. If the rights to Government-financed inventions are given away to contractors, the Government itself will be promoting the concentration of economic power in the hands of a few large conglomerates.

To appreciate fully the implications of a giveaway Government patent policy, one need only consider a hypothetical case. Suppose, with the vast sums of Government money that will be spent in efforts to find solutions to the energy problems, a contractor, at public expense, develops a technological breakthrough. What would an ordinary taxpayer think when he learned that this company could, for 17 years, legally control the dissemination, use, and pricing of this invention?

For the reasons I have stated, I believe that the Government should have a strict policy of retaining, for all citizens, the rights to patents developed at taxpayer expense. Specifically, I recommend the following:

1. All Government agencies should be required by law to retain patent rights, except in exceptional circumstances, to all inventions developed at Government expense.

2. Prior to a Government agency waiving the Government's rights to any patent, the Attorney General should be required to make a written determination that the waiver is required to obtain performance of work essential to the mission of the agency and that granting the waiver will not adversely affect competition or small business.
3. All inventors should be required to certify on their patent applications that the invention was developed under a Government contract and duly reported; or that the invention was not developed under Government contracts. Criminal penalties should be provided for individuals or contractors who file, as their own, patents that have been developed at Government expense.

THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY.

STATEMENT OF
ADMIRAL H.G. RICKOVER, U.S. NAVY
TO THE
SUBCOMMITTEE ON THE CONSTITUTION
OF THE
SENATE COMMITTEE ON THE JUDICIARY

JUNE 6, 1979

UNIVERSITY AND SMALL BUSINESS PATENT PROCEDURES ACT

THANK YOU FOR INVITING ME TO TESTIFY ON "THE UNIVERSITY AND SMALL BUSINESS PATENT PROCEDURES ACT."

ONE STATED PURPOSE OF THE BILL IS TO ESTABLISH A UNIFORM FEDERAL PATENT PROCEDURE FOR SMALL BUSINESSES AND UNIVERSITIES. AS I UNDERSTAND IT, THE BILL PROVIDES THAT, IN ALMOST ALL CASES, SMALL BUSINESSES AND UNIVERSITIES MAY ELECT TO RETAIN TITLE TO INVENTIONS DEVELOPED UNDER THEIR GOVERNMENT CONTRACTS; THE GOVERNMENT KEEPS A NONEXCLUSIVE LICENSE TO USE THE INVENTION FOR GOVERNMENT PURPOSES.

IF THE GOVERNMENT SUBSEQUENTLY DETERMINES THAT THE CONTRACTOR IS NOT EFFECTIVELY TAKING STEPS TO ACHIEVE PRACTICAL APPLICATION OF THE INVENTION WITHIN A REASONABLE TIME, THE GOVERNMENT WOULD HAVE SO-CALLED "MARCH-IN RIGHTS", UNDER WHICH THE GOVERNMENT CAN REQUIRE THE PATENT HOLDER TO LICENSE THE INVENTION TO OTHERS.

IF IN 10 YEARS A SMALL BUSINESS OR UNIVERSITY MAKES MORE THAN $250,000 IN AFTER-TAX PROFITS FROM LICENSING THE INVENTION, OR $2,000,000 ON SALES OF PRODUCTS INCORPORATING THE INVENTION, THE GOVERNMENT IS ENTITLED TO A SHARE OF ALL

ADDITIONAL PROCEEDS UP TO THE AMOUNT OF GOVERNMENT FUNDS SPENT IN MAKING THE INVENTION.

IN MY OPINION, GOVERNMENT CONTRACTORS - INCLUDING SMALL BUSINESSES AND UNIVERSITIES - SHOULD NOT BE GIVEN TITLE TO INVENTIONS DEVELOPED AT GOVERNMENT EXPENSE. THESE INVENTIONS ARE PAID FOR BY THE PUBLIC AND THEREFORE SHOULD BE AVAILABLE FOR ANY CITZEN TO USE OR NOT AS HE SEES FIT.

IN PRIVATE INDUSTRY, THE COMPANY THAT PAYS FOR THE WORK GENERALLY GETS THE PATENT RIGHTS. SIMILARLY, COMPANIES GENERALLY CLAIM TITLE TO THE INVENTIONS OF THEIR EMPLOYEES ON THE BASIS THAT THE COMPANY PAYS THEIR WAGES. IN DOING BUSINESS WITH THE GOVERNMENT, HOWEVER, THESE SAME COMPANIES REVERSE THE STANDARD, CONTENDING THAT THE PATENT RIGHTS SHOULD BELONG TO THE ONE WHO COMES UP WITH THE IDEA, NOT THE ONE WHO FOOTS THE BILL.

IN RATIONALIZING THEIR CLAIM FOR TITLE OR EXCLUSIVE RIGHTS TO GOVERNMENT FINANCED INVENTIONS, CONTRACTORS OFTEN USE THE AGE OLD ARGUMENTS OF THE PATENT LOBBY; THEY CLAIM THAT THE GOVERNMENT IS STIFLING TECHNOLOGY BY RETAINING TITLE TO APPROXIMATELY 25,000 PATENTS; THAT THESE PATENTS REFLECT WORTHWHILE IDEAS THAT ARE NOT BEING USED; THAT WITHOUT PATENT PROTECTION COMPANIES WILL NOT COMMERCIALIZE THESE INVENTIONS; AND THAT THE PUBLIC THEREFORE DOES NOT GET THE BENEFIT OF THE GOVERNMENT'S R&D EXPENDITURES.

GENERALLY, THESE ARE THE ARGUMENTS OF PATENT LAWYERS, CONTRACTORS, AND THOSE UNABLE TO FIND SPONSORS FOR THEIR INVENTIONS. TRULY GOOD IDEAS TEND TO BE USED. THE REASON SO MANY GOVERNMENT-OWNED AND PRIVATELY-OWNED PATENTS ARE NOT USED STEMS FROM CONSIDERATIONS OTHER THAN THE NEED FOR MONOPOLY PATENT RIGHTS.

A VAST MAJORITY OF PATENTS ARE OF LITTLE OR NO SIGNIFICANCE. MANY COMPANIES SEEM TO FILE PATENTS DEFENSIVELY; MEANING THAT THEY FILE NUMEROUS PATENTS FOR MINOR DETAILS PRIMARILY TO KEEP SOMEONE ELSE FROM GETTING A PATENT IN THAT AREA OR TO DISCOURAGE POTENTIAL COMPETITORS. SOME PEOPLE FILE PATENTS AS STATUS SYMBOLS; OTHERS SIMPLY MISJUDGE THE ATTRACTIVENESS OF THEIR IDEAS. THE PATENT OFFICE ITSELF, WHEN IN DOUBT, TENDS TO PATENT QUESTIONABLE ITEMS ON THE ASSUMPTION THAT, IF THE PATENT BECOMES IMPORTANT, THE VALIDITY OF THE PATENT CAN BE TESTED IN COURT.

FINALLY, IT IS ALMOST IMPOSSIBLE TO TELL THE EXTENT TO WHICH PATENTED INVENTIONS ARE BEING USED, PARTICULARLY IN THE CASE OF GOVERNMENT-OWNED PATENTS. GOVERNMENT AGENCIES DO NOT HAVE A REASON TO SEARCH FOR PATENT INFRINGEMENT. THE GOVERNMENT, UNLIKE PRIVATE PARTIES, GENERALLY HAS NO DESIRE TO PREVENT OTHERS FROM USING ITS INVENTIONS. THE REASONS THE GOVERNMENT SHOULD TAKE TITLE TO THESE INVENTIONS ARE PRIMARILY TO ENSURE THE GOVERNMENT IS NOT SUBSEQUENTLY BARRED BY SOMEONE ELSE'S PATENT FROM USING THE IDEA; TO PRECLUDE THE

ESTABLISHMENT OF A PRIVATE MONOPOLY FOR A PUBLICLY FINANCED INVENTION; AND TO ENSURE THE PUBLIC HAS EQUAL ACCESS TO THESE INVENTIONS.

PATENTS ARE GENERALLY INCIDENTAL TO GOVERNMENT RESEARCH AND DEVELOPMENT WORK, NOT ITS PRIMARY PURPOSE. WHEN I PLACE AN R&D CONTRACT FOR A NEW DESIGN REACTOR, IT IS PRINCIPALLY TO WORK OUT THE DETAILS OF A DESIGN AND TO IDENTIFY AND RESOLVE THE PROBLEMS OF DESIGN, MANUFACTURE, AND OPERATION. IF PATENTABLE INVENTIONS ARISE IN THE COURSE OF THIS WORK, THEY GENERALLY INVOLVE ONLY SMALL DESIGN FEATURES, NOT ENTIRELY NEW CONCEPTS. THE BILL HOWEVER SEEMS TO BE BASED ON THE NOTION THAT THE GOVERNMENT-OWNED PATENTS ARE PREDOMINANTLY GOOD IDEAS WHICH GOVERNMENT AGENCIES SHOULD TRY TO FORCE OUT INTO THE MARKET PLACE. THE BILL STATES "IT IS THE POLICY AND OBJECTIVE OF THE CONGRESS TO USE THE PATENT SYSTEM TO PROMOTE THE UTILIZATION OF INVENTIONS ARISING FROM FEDERALLY SUPPORTED RESEARCH OR DEVELOPMENT...." AND TO "PROTECT THE PUBLIC AGAINST NON-USE OR UNREASONABLE USE OF INVENTIONS." (EMPHASIS ADDED)

UNDER THIS BILL, GOVERNMENT AGENCIES WOULD BE EXPECTED TO PROMOTE ACTIVELY THE INVENTIONS THAT IT NOW OWNS AND THOSE THAT ARISE UNDER NEW CONTRACTS. THE BILL FURTHER REQUIRES THAT THE GENERAL ACCOUNTING OFFICE AUDIT THESE AGENCIES ANNUALLY AND REPORT TO THE CONGRESS ON THEIR PROGRESS IN THIS EFFORT.

IN MY OPINION, THE BILL OVEREMPHASIZES THE IMPORTANCE OF PATENTS AND, IF ENACTED, WOULD TEND TO DIVERT ATTENTION AND RESOURCES OF THE GOVERNMENT AGENCIES AWAY FROM THEIR MAIN FUNCTIONS. MOST AGENCIES HAVE ENOUGH TROUBLE DOING THE JOB THEY WERE ESTABLISHED TO DO; THEY SHOULD NOT BE REQUIRED TO SPEND THEIR TIME AND RESOURCES TRYING TO PROMOTE PATENTS OF DUBIOUS VALUE. I BELIEVE THAT THE DECISION TO USE OR NOT USE GOVERNMENT FINANCED INVENTIONS IS ONE BEST LEFT FOR THE PRIVATE SECTOR.

THE BILL INCLUDES SOME SAFEGUARDS WHICH I BELIEVE WOULD BE CUMBERSOME AND INEFFECTIVE. THE FIRST INVOLVES THE GOVERNMENT'S ABILITY TO FORCE WIDE SPREAD LICENSING UNDER ITS SO-CALLED "MARCH-IN" RIGHTS, IF A CONTRACTOR WHO HOLDS TITLE TO A GOVERNMENT FINANCED INVENTION WERE NOT SATISFACTORILY DEVELOPING AND PROMOTING IT. THE GOVERNMENT HAS HAD MARCH-IN RIGHTS SINCE 1963, BUT TO MY KNOWLEDGE HAS NEVER USED THEM. TO BE IN A POSITION TO EXERCISE THESE RIGHTS A GOVERNMENT AGENCY WOULD HAVE TO STAY INVOLVED IN THE PLANS AND ACTIONS OF ITS PATENT HOLDERS AND CHECK UP ON THEM. IF A GOVERNMENT AGENCY EVER DECIDED TO EXERCISE ITS MARCH-IN RIGHTS AND THE PATENT HOLDER CONTESTED THE ACTION, NO DOUBT THE DISPUTE COULD BE LITIGATED FOR YEARS. FOR THIS REASON I BELIEVE THIS SAFEGUARD IS LARGELY COSMETIC. IT WOULD RESULT IN MUCH ADDITIONAL PAPERWORK BUT WOULD PROBABLY BE USED NO MORE THAN IN THE PAST.

A SECOND CUMBERSOME AND PROBABLY INEFFECTIVE SAFEGUARD INVOLVES THE PROVISIONS FOR RETURN OF GOVERNMENT INVESTMENT. THE PROPOSED PROCEDURE INVOLVES KEEPING TRACK OF HOW MUCH THE GOVERNMENT INVESTED IN THE INVENTION AND WHAT AFTER-TAX PROFITS A CONTRACTOR HAS MADE OVER A TEN YEAR PERIOD FROM LICENSING AGREEMENTS OR DIRECT MANUFACTURING ASSOCIATED WITH THE INVENTION. SINCE THERE ARE NO FIRM STANDARDS FOR CALCULATING THESE FIGURES, THE LIKELIHOOD OF MANIPULATION AND DISPUTES IS GREAT. TO COMPLY WITH PROVISIONS OF THIS BILL, GOVERNMENT AGENCIES WOULD HAVE TO SET UP ORGANIZATIONS; ISSUE AND IMPLEMENT REGULATIONS; PROMOTE PATENTS; REVIEW AND AUDIT CONTRACTOR PATENT DEVELOPMENT AND UTILIZATION PLANS; INTERVENE WHEN THESE PLANS ARE NOT CARRIED OUT; NEGOTIATE AGREEMENTS; AUDIT BOOKS AND RECORDS. I BELIEVE THAT THESE REQUIREMENTS WILL BE EFFECTIVE ONLY IN ADDING MUCH UNNECESSARY PAPERWORK.

CONTRACTORS AND PATENT LAWYERS OFTEN CLAIM THAT CONTRACTORS WILL DECLINE GOVERNMENT WORK IF THEY ARE NOT GIVEN TITLE TO PATENTS THEY DEVELOP UNDER THE GOVERNMENT CONTRACT. MY EXPERIENCE HAS BEEN THAT GOVERNMENT PATENT POLICY IS RARELY THE DOMINENT FACTOR IN COMPANY DECISIONS TO ACCEPT OR REJECT WORK. BUSINESSMEN TEND TO VALUE THE TANGIBLE BENEFITS OF PROFITS AND TECHNICAL KNOW-HOW FROM GOVERNMENT ORDERS MORE THAN THE SPECULATIVE BENEFITS OF PATENT RIGHTS. FOR MORE THAN 30 YEARS I HAVE BEEN ABLE TO

OBTAIN THE R&D AND MANUFACTURING WORK NEEDED FOR THE NAVAL NUCLEAR PROPULSION PROGRAM WITHOUT HAVING TO GIVE AWAY GOVERNMENT PATENT RIGHTS.

ALTHOUGH S414 IS SUPPOSED TO BE ABOUT UNIVERSITIES AND SMALL BUSINESSES, THERE IS ANOTHER PART OF THE BILL, SECTION 208, WHICH WOULD ESTABLISH PATENT LICENSING PROCEDURES APPLICABLE TO ALL CONTRACTORS, BOTH LARGE AND SMALL. UNDER THIS SECTION, GOVERNMENT AGENCIES WOULD BE SPECIFICALLY AUTHORIZED TO GRANT EXCLUSIVE LICENSES TO USE GOVERNMENT-OWNED INVENTIONS. UNDER THE BILL, THE GENERAL SERVICES ADMINISTRATION IS AUTHORIZED TO PRESCRIBE THE REGULATIONS GOVERNING SUCH LICENSING. IN THE PAST, QUESTIONS HAVE ARISEN AS TO THE LEGAL AUTHORITY OF VARIOUS GOVERNMENT AGENCIES TO GRANT EXCLUSIVE LICENSES TO GOVERNMENT OWNED INVENTIONS OR TO WAIVE THE GOVERNMENT'S RIGHTS TO TITLE IN SUCH INVENTIONS. THIS BILL WOULD RESOLVE THESE QUESTIONS IN FAVOR OF BEING ABLE TO GIVE AWAY GOVERNMENT PATENT RIGHTS.

JUDGING FROM THE PAST PERFORMANCE OF MANY GOVERNMENT AGENCIES, THE ATTITUDE OF THE DEPARTMENT OF COMMERCE, AND THE INFLUENCE OF LARGE CONTRACTORS IN INDIVIDUAL GOVERNMENT AGENCIES, THERE IS NO DOUBT IN MY MIND THAT THE REGULATIONS WOULD BE WRITTEN TO ENCOURAGE THE GRANTING OF EXCLUSIVE PATENT RIGHTS TO GOVERNMENT CONTRACTORS. THE BILL REQUIRES GOVERNMENT OFFICIALS TO MAKE CERTAIN FORMAL DETERMINATIONS PRIOR TO GRANTING EXCLUSIVE LICENSES. HOWEVER, THE BILL PROVIDES A

FRAMEWORK UNDER WHICH GOVERNMENT AGENCIES COULD RATIONALIZE THE GRANTING OF EXCLUSIVE LICENSES TO LARGE CONTRACTORS. EITHER BY GETTING GOVERNMENT AGENCIES TO WAIVE ITS PATENT RIGHTS, AS AUTHORIZED UNDER SOME OF THE PRESENT LAWS, OR UNDER THE LICENSING REGULATIONS THAT WOULD EVOLVE UNDER THE PROPOSED BILL, MANY LARGE CONTRACTORS WOULD BE ABLE TO OBTAIN--PERHAPS AT THE OUTSET OF THE CONTRACT--TITLE OR EXCLUSIVE LICENSES TO INVENTIONS DEVELOPED UNDER THEIR CONTRACTS WITH THE GOVERNMENT. THIS SHOULD BE PROHIBITED.

THESE LICENSING PROVISIONS OF THIS BILL ARE IDENTICAL TO THE LANGUAGE PROPOSED TO THE HOUSE SCIENCE AND TECHNOLOGY COMMITTEE DURING THE PREVIOUS SESSION OF CONGRESS AS PART OF A BILL TO PROMOTE TECHNOLOGY. THAT BILL AND A SIMILAR ONE THAT WAS REINTRODUCED RECENTLY ARE AIMED AT GIVING BOTH LARGE AND SMALL CONTRACTORS EXCLUSIVE RIGHTS TO INVENTIONS DEVELOPED UNDER THEIR GOVERNMENT CONTRACTS. IT APPEARS THAT THESE SAME INTERESTS ARE TRYING TO TAKE ADVANTAGE OF THE SMALL BUSINESS AND UNIVERSITY TITLE OF S.414 TO ACHIEVE WHAT THEY SO FAR HAVE FAILED TO ACHIEVE IN THESE OTHER BILLS.

IN SUMMARY, I BELIEVE THAT INVENTIONS PAID FOR BY THE GOVERNMENT SHOULD BELONG TO THE PUBLIC, AND ALL CITIZENS SHOULD HAVE AN EQUAL OPPORTUNITY TO USE THE INVENTIONS. PRIVATE FIRMS, PARTICULARLY LARGE COMPANIES, SHOULD NOT BE ABLE TO GET A 17 YEAR MONOPOLY ON INVENTIONS THEY DEVELOP

WITH TAX DOLLARS. WHEN GOVERNMENT AGENCIES ROUTINELY GRANT CONTRACTORS EXCLUSIVE RIGHTS TO USE SUCH INVENTIONS, IT PROMOTES GREATER CONCENTRATION OF ECONOMIC POWER IN THE HANDS OF LARGE CORPORATIONS; IT IMPEDES THE DEVELOPMENT AND DISSEMINATION OF TECHNOLOGY; IT IS COSTLY TO THE TAXPAYER; AND IT HURTS SMALL BUSINESS.

I TESTIFIED IN MORE DETAIL ON THE GENERAL SUBJECT OF GOVERNMENT PATENT POLICY AS IT AFFECTS SMALL BUSINESS BEFORE THE SENATE SMALL BUSINESS COMMITTEE ON DECEMBER 19, 1977. WITH YOUR PERMISSION, MR. CHAIRMAN, I WOULD APPRECIATE HAVING THAT STATEMENT INCLUDED AS PART OF MY TESTIMONY TODAY.

I RECOGNIZE THAT DESPITE MY CONVICTIONS ON THIS SUBJECT, THERE OFTEN IS STRONG SENTIMENT IN THE CONGRESS TO DO SOMETHING SPECIAL FOR SMALL BUSINESSES OR UNIVERSITIES. IF YOU DO DECIDE TO PROVIDE MORE FAVORABLE TREATMENT FOR THEM, I RECOMMEND THAT YOU DO SO IN A MANNER WHICH ENSURES THAT SMALL BUSINESSES AND UNIVERSITIES, RATHER THAN LARGE CONTRACTORS,IN FACT HAVE PRIORITY OR AT LEAST EQUAL ACCESS TO INVENTIONS DEVELOPED AT GOVERNMENT EXPENSE. TO ACCOMPLISH THIS, I RECOMMEND THAT S. 414 BE MODIFIED AS FOLLOWS:

(1) REQUIRE THAT THE GOVERNMENT RETAIN TITLE TO ALL INVENTIONS DEVELOPED AT GOVERNMENT EXPENSE.

(2) GIVE SMALL BUSINESSES AND UNIVERSITIES AN AUTOMATIC 5-YEAR EXCLUSIVE LICENSE TO INVENTIONS THEY DEVELOP UNDER

THEIR GOVERNMENT CONTRACTS. AT THE END OF THIS PERIOD THE INVENTION WOULD FALL IN THE PUBLIC DOMAIN. THIS WOULD PROVIDE LIMITED PROTECTION BUT NOT A 17-YEAR MONOPOLY. IT WOULD ALSO OBVIATE THE NEED FOR THE CUMBERSOME SAFEGUARD PROVISIONS OF THE PRESENT BILL, E.G. "MARCH-IN RIGHTS," "RETURN OF GOVERNMENT INVESTMENT," AND THE VAST ADMINISTRATIVE EFFORT ASSOCIATED WITH THEM.

(3) REVISE THE PREAMBLE TO ELIMINATE ANY IMPLICATION THAT GOVERNMENT AGENCIES SHOULD (A) ACTIVELY AND INDISCRIMINATELY PROMOTE ALL INVENTIONS ARISING FROM FEDERALLY SUPPORTED RESEARCH OR DEVELOPMENT, AND (B) "PROTECT THE PUBLIC AGAINST NON-USE...OF INVENTIONS." ONLY A SMALL PORTION OF THE INVENTIONS PATENTED BY GOVERNMENT OR INDUSTRY TURN OUT TO BE WORTHWHILE.

(4) PROHIBIT AGENCIES FROM WAIVING THE GOVERNMENT'S RIGHTS TO TAKE TITLE TO PATENTS DEVELOPMENT AT GOVERNMENT EXPENSE. WHENEVER SUCH WAIVERS ARE GRANTED, SMALL BUSINESSES OR OTHER FIRMS ARE FORECLOSED FROM THE OPPORTUNITY TO USE THE INVENTION.

(5) PROHIBIT CONTRACTS WHICH AUTOMATICALLY PROVIDE TO THE CONTRACTOR EXCLUSIVE LICENSES TO ANY INVENTIONS DEVELOPED UNDER THE CONTRACT, EXCEPT AS INDICATED IN PARAGRAPH (2) ABOVE. OTHER FIRMS SHOULD AT LEAST HAVE AN EQUAL OPPORTUNITY TO USE THE INVENTION NON-EXCLUSIVELY OR BID FOR THE EXCLUSIVE RIGHT TO USE IT.

(6) Require that the Commerce Department publicize the availability of patents to which the Government has title for a period of six months. If no one requests a non-exclusive license, the rights to an exclusive license could be granted to the highest bidder with small businesses having priority in the bidding.

(7) Eliminate the statutory requirement for the GAO to conduct an annual review of agency performance in the area of patents. It does not seem appropriate to include this as a permanent requirement of the law.

In my opinion the effects of Government patent policy are continually exaggerated and overplayed by the patent lawyers and contractors who have a vested interest in the matter. Proposed changes regarding ownership and use of patents developed at Government expense are always presented under the banner of high sounding principles and purposes. Having observed this issue for many years, I am thoroughly convinced that almost all of such proposed changes are contrary to the best interests of the United States.

The basic principle embodied in present laws is that the Government should have title to inventions developed with Government funds. That is a sound principle I fully support. It should be modified, waived, or otherwise tampered with only for compelling reasons--and even then with great care and in the most limited way needed to accomplish the purpose.

THIS STATEMENT REFLECTS THE VIEWS OF
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
THE NAVY OR THE DEPARTMENT OF THE NAVY

STATEMENT OF
ADMIRAL H.G. RICKOVER, U.S. NAVY
TO THE
HOUSE COMMITTEE ON GOVERNMENT OPERATIONS
SEPTEMBER 16, 1980

GOVERNMENT PATENT POLICY

THANK YOU FOR INVITING ME TO TESTIFY ON H.R. 6933 WHICH PROPOSES SIGNIFICANT CHANGES IN PATENT POLICY, PARTICULARLY FOR INVENTIONS DEVELOPED WITH PUBLIC FUNDS. BASED ON 40 YEARS EXPERIENCE IN TECHNOLOGY AND IN DEALING WITH VARIOUS SEGMENTS OF AMERICAN INDUSTRY, I BELIEVE THE BILL WOULD ACHIEVE EXACTLY THE OPPOSITE OF WHAT IT PURPORTS. IT WOULD IMPEDE, NOT ENHANCE, THE DEVELOPMENT AND DISSEMINATION OF TECHNOLOGY. IT WOULD HURT SMALL BUSINESS. IT WOULD INHIBIT COMPETITION. IT WOULD PROMOTE GREATER CONCENTRATION OF ECONOMIC POWER IN THE HANDS OF LARGE CORPORATIONS. IT WOULD BE COSTLY TO THE TAXPAYER.

I REJECT THE NOTION THAT IN ADDITION TO THE EXPERIENCE, PROFITS, AND OTHER BENEFITS THAT ARISE FROM GOVERNMENT CONTRACTS, CONTRACTORS SHOULD ALSO BE GIVEN MONOPOLY RIGHTS TO INVENTIONS THAT GROW OUT OF THESE CONTRACTS. BOTH TECHNOLOGY AND THE PUBLIC INTEREST ARE BEST SERVED WHEN INVENTIONS PAID FOR BY THE PUBLIC ARE MADE AVAILABLE FOR ALL CITIZENS WITHOUT ANY LIMITATIONS ON THE USE OF THESE INVENTIONS.

THE THRUST OF MOST OF THE PRESENT LAWS GOVERNING PATENT RIGHTS IS THAT THE GOVERNMENT SHOULD RETAIN TITLE TO PATENTS DEVELOPED AT PUBLIC EXPENSE. SECTION SIX OF THE PROPOSED BILL ENTITLED THE "GOVERNMENT PATENT POLICY ACT OF 1980" REVERSES THIS PRINCIPLE SO THAT GOVERNMENT CONTRACTORS WOULD AUTOMATICALLY TAKE TITLE TO ANY INVENTIONS ARISING UNDER THEIR CONTRACTS WITH THE GOVERNMENT. FEDERAL AGENCIES COULD RETAIN TITLE TO INVENTIONS ONLY IN THE LIMITED CIRCUMSTANCES PRESCRIBED BY THE BILL.

THE LANGUAGE OF THE BILL OBFUSCATES THIS END RESULT. THE BILL CREATES SEPARATE AND SUPPOSEDLY DIFFERENT RULES FOR TWO BROAD GROUPS OF GOVERNMENT CONTRACTORS -- "SMALL BUSINESSES AND NON-PROFIT ORGANIZATIONS" AND "OTHER CONTRACTORS." IN THE CASE OF SMALL BUSINESSES AND NON-PROFIT ORGANIZATIONS, TITLE TO INVENTIONS UNDER GOVERNMENT CONTRACTS WOULD VEST IN THE CONTRACTOR FROM THE OUTSET. IN THE CASE OF LARGE CONTRACTORS, THE CONTRACTOR WOULD HOLD TITLE TO THE INVENTION FOR 4 AND ONE-HALF YEARS, AND IS GUARANTEED AN EXCLUSIVE LICENSE TO THE INVENTION, IN WHATEVER FIELDS OF USE THE CONTRACTOR CHOOSES, FOR THE REMAINDER OF THE 17 YEAR LIFE OF THE PATENT.

THE PROVISION OF THE BILL UNDER WHICH THE GOVERNMENT RECAPTURES FROM LARGE CONTRACTORS TITLE TO INVENTIONS AFTER 4 AND ONE-HALF YEARS IS AN EXERCISE IN SEMANTICS -- A RED HERRING BY WHICH THE PATENT LOBBY SEEKS TO DISGUISE THE TRUE EFFECT OF THE BILL. FOR ALL PRACTICAL PURPOSES, THE BILL WOULD GIVE ALL CONTRACTORS, BOTH LARGE AND SMALL, A 17 YEAR MONOPOLY TO INVENTIONS DEVELOPED UNDER THEIR CONTRACTS WITH THE GOVERNMENT.

IN PRIVATE INDUSTRY, THE COMPANY THAT SUBCONTRACTS FOR RESEARCH AND DEVELOPMENT WORK GENERALLY RECEIVES THE PATENT RIGHTS TO ANY INVENTIONS GROWING OUT OF THAT WORK. SIMILARLY, COMPANIES GENERALLY

TAKE TITLE TO THE INVENTIONS OF THEIR EMPLOYEES ON THE BASIS THAT THE PATENT RIGHTS BELONG TO THE ONE WHO PAYS THE WAGES. IN DOING BUSINESS WITH THE GOVERNMENT, HOWEVER, THE PATENT LOBBY CONTENDS JUST THE OPPOSITE -- THAT PATENT RIGHTS SHOULD BELONG TO THE ONE WHO COMES UP WITH THE IDEA, NOT THE ONE WHO FOOTS THE BILL.

THE PATENT INTERESTS HAVE BEEN WORKING BEHIND THE SCENES FOR MANY YEARS TO PROMOTE THIS IDEA. TWENTY YEARS AGO, THEY TRIED TO GET CONGRESS TO INCORPORATE A GIVE-AWAY PATENT POLICY IN LEGISLATION THAT SET UP THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA). CONGRESS WISELY INSISTED THAT THE GOVERNMENT RETAIN TITLE TO INVENTIONS IN THIS NEW FIELD, JUST AS IT DID IN SETTING UP THE ATOMIC ENERGY COMMISSION. SINCE THAT TIME, HOWEVER, THE PATENT LOBBY HAS CONTINUED TO LOOK FOR OPPORTUNITIES TO REVERSE GOVERNMENT PATENT POLICY.

IN PROMOTING THE CURRENT BILL, THE PATENT INTERESTS CONTEND THAT GIVING GOVERNMENT CONTRACTORS PATENT RIGHTS TO PUBLICLY FUNDED INVENTIONS WILL SOMEHOW HELP TURN AROUND A PERCEIVED DELINE IN TECHNOLOGICAL INNOVATION AND PRODUCTIVITY IN THIS COUNTRY. THEY CURRENTLY CLAIM THAT BY RETAINING TITLE TO PUBLICLY FUNDED INVENTIONS THE GOVERNMENT STIFLES TECHNOLOGY; THAT THE RESULTS OF THE GOVERNMENT'S LARGE RESEARCH AND DEVELOPMENT EXPENDITURES ARE REFLECTED IN THE APPROXIMATELY 25,000 PATENTS THE GOVERNMENT PRESENTLY OWNS; THAT THE PUBLIC IS NOT RECEIVING THE BENEFIT OF THIS TECHNOLOGY BECAUSE ONLY A SMALL PERCENTAGE OF THESE PATENTS ARE IN USE; AND THAT THE PUBLIC WILL NOT RECEIVE THE BENEFIT FROM FUTURE RESEARCH AND DEVELOPMENT UNLESS CHANGES ARE MADE IN THE GOVERNMENT'S PATENT POLICY. THEY FURTHER CONTEND THAT IN THE ABSENCE OF PATENT PROTECTION, INDIVIDUALS AND COMPANIES WILL NOT INVEST IN THE DEVELOPMENT AND MARKETING OF TECHNOLOGY DEVELOPED UNDER GOVERNMENT CONTRACTS, BUT THAT THIS PROBLEM

COULD BE RESOLVED BY GIVING CONTRACTORS THE EXCLUSIVE RIGHTS TO INVENTIONS DEVELOPED AT GOVERNMENT EXPENSE.

IT IS NONSENSE TO THINK THAT OUR TECHNOLOGICAL GROWTH WILL SUFFER IF CONTRACTORS DO NOT RECEIVE TITLE TO PATENTS GENERATED UNDER GOVERNMENT CONTRACTS. THE IMPORTANCE OF PATENTS IS BEING GREATLY EXAGGERATED BY THOSE WHO WOULD BENEFIT MOST FROM THE PROPOSED LEGISLATION; NAMELY, PATENT LAWYERS AND LARGE CORPORATIONS WHO, YEAR AFTER YEAR, RECEIVE THE LION'S SHARE OF GOVERNMENT RESEARCH AND DEVELOPMENT EXPENDITURES.

TRULY GOOD IDEAS TEND TO BE USED EVEN WITHOUT A PATENT. MANY OF THE WORTHWHILE INVENTIONS WOULD BE DISCOVERED AND ADOPTED IN THE MARKETPLACE BASED ON THEIR MERITS. IF ONE COMPANY DID NOT GENERATE THE IDEA, ANOTHER FIRM WOULD BECAUSE OF THE NATURE OF THE WORK BEING DONE. OFTEN, IDENTICAL IDEAS CROP UP ALMOST SIMULTANEOUSLY IN DIFFERENT COMPANIES. FURTHER, MANY GOOD IDEAS CAN BE IMPLEMENTED OR "COMMERCIALIZED" WITHOUT SPECIAL INVESTMENT IN R&D OR NEW FACILITIES, OR THEY ARE SUFFICIENTLY PROMISING THAT COMPANIES WILL INVEST IN THEM WITHOUT PATENT PROTECTION. IN THESE CASES, THE PATENT SYSTEM, RATHER THAN PROMOTING TECHNOLOGY, SIMPLY DETERMINES WHETHER SOMEONE IS ENTITLED TO EXACT A ROYALTY FOR USE OF THE IDEA.

FROM WHAT I HAVE SEEN OVER MANY YEARS, THE MAJORITY OF PATENTS HAVE LITTLE SIGNIFICANCE OR MERIT. SOME PEOPLE FILE PATENTS AS STATUS SYMBOLS; OTHERS SIMPLY MISJUDGE THE ATTRACTIVENESS OF THEIR IDEAS. THE PATENT OFFICE, WHEN IN DOUBT, TENDS TO PATENT QUESTIONABLE ITEMS ON THE ASSUMPTION THAT, IF THE PATENT BECOMES IMPORTANT, THE VALIDITY OF THE PATENT CAN BE TESTED IN COURT.

RECOGNIZING THIS, MANY LARGE CORPORATIONS PATENT MINOR IMPROVEMENTS OR DESIGN FEATURES SIMPLY TO DISCOURAGE COMPETITORS OR POTENTIAL COMPETITORS -- PARTICULARLY SMALL FIRMS -- FROM TRYING TO

ENTER THE MARKET. TO CHALLENGE THE VALIDITY OF ANY OF THESE PATENTS CAN TAKE HUNDREDS OF THOUSANDS OF DOLLARS AND YEARS OF LITIGATION. ALTHOUGH A HIGH PERCENTAGE OF PATENTS CONTESTED IN COURT ARE RULED INVALID, NOT MANY FIRMS CAN AFFORD THE LENGTHY LITIGATION THAT IS REQUIRED TO CHALLENGE A PATENT.

IF THE GOVERNMENT WERE TO GIVE ITS CONTRACTORS TITLE TO INVENTIONS DEVELOPED AT PUBLIC EXPENSE, IT WOULD BE DISCOURAGING COMPETITION AND MAKING IT EASIER FOR LARGE BUSINESSES TO FREEZE OUT THEIR SMALLER COMPETITORS. THE ESSENCE OF AN INDUSTRIAL ORGANIZATION IS THE KNOW-HOW DEVELOPED BY IT -- THE TRADE SECRETS AND THE TECHNIQUES; THESE ARE NOT PATENTABLE QUALITIES. THEY ARE THINGS WHICH ARE INHERENT IN A COMPANY, IN ITS METHODS, IN ITS MANAGEMENT AND TRAINED EMPLOYEES, IN THE KIND OF MACHINE TOOLS IT HAS, HOW IT USES THESE TOOLS; AND SO ON.

IT IS OFTEN SAID THAT UNLESS THE GOVERNMENT GIVES AWAY ITS PATENT RIGHTS, COMPANIES WILL REFUSE GOVERNMENT CONTRACTS. GOVERNMENT PATENT POLICY IS RARELY THE DOMINANT FACTOR IN COMPANY DECISIONS TO ACCEPT OR REJECT WORK. THE TANGIBLE BENEFITS OF PROFITS AND TECHNICAL KNOW-HOW FROM GOVERNMENT ORDERS ARE FAR MORE VALUABLE TO MOST CONTRACTORS THAN THE SPECULATIVE BENEFITS OF PATENT RIGHTS. FOR MORE THAN THIRTY YEARS I HAVE BEEN ABLE TO OBTAIN THE R&D AND MANUFACTURING WORK NEEDED FOR THE NAVAL NUCLEAR PROPULSION PROGRAM WITHOUT HAVING TO GIVE AWAY GOVERNMENT PATENT RIGHTS.

PATENTS ARE GENERALLY INCIDENTAL TO GOVERNMENT RESEARCH AND DEVELOPMENT WORK, NOT ITS PRIMARY PURPOSE, AND THEREFORE ARE NOT REALLY INDICATIVE OF THE TECHNOLOGY DEVELOPED. WHEN I PLACE AN R&D CONTRACT FOR A NEW DESIGN REACTOR, IT IS PRINCIPALLY TO WORK OUT THE DETAILS OF A DESIGN AND TO IDENTIFY AND RESOLVE THE PROBLEMS OF DESIGN, MANUFACTURE, AND OPERATION. IF PATENTABLE INVENTIONS ARISE IN THE

COURSE OF THIS WORK, THEY GENERALLY INVOLVE ONLY SMALL DESIGN FEATURES, NOT ENTIRELY NEW CONCEPTS.

CONGRESS SHOULD NOT BE OVERLY CONCERNED ABOUT THE ALLEGEDLY LOW USAGE RATE OF GOVERNMENT-OWNED PATENTS. IT IS ALMOST IMPOSSIBLE TO TELL THE EXTENT TO WHICH THESE INVENTIONS ARE BEING USED, SINCE THE GOVERNMENT HAS NO REASON TO SEARCH FOR, OR DISCOURAGE PATENT INFRINGEMENT. UNLIKE PRIVATE FIRMS, THE GOVERNMENT TAKES TITLE TO INVENTIONS TO PROTECT THE PUBLIC'S RIGHTS TO USE THE INVENTION - NOT TO DISCOURAGE OTHERS FROM USING IT.

IN MANY AREAS TODAY, THE GOVERNMENT IS IN THE FOREFRONT OF TECHNOLOGICAL DEVELOPMENT. THE PUBLIC IS FINANCING DEVELOPMENT OF ENTIRE NEW TECHNOLOGIES. THE U.S. GOVERNMENT SPENT $30 BILLION IN FISCAL YEAR 1980 AND INTENDS TO SPEND MORE THAN THIS AMOUNT IN FISCAL YEAR 1981 FOR RESEARCH AND DEVELOPMENT.

THE MAJORITY OF THESE FEDERAL RESEARCH AND DEVELOPMENT DOLLARS WILL GO TO LARGE CONTRACTORS. FOR EXAMPLE, IN FISCAL YEAR 1979, 61 PERCENT OF THE DEFENSE DEPARTMENT'S RESEARCH AND DEVELOPMENT PROCUREMENT BUDGET WENT TO ONLY NINETEEN CONTRACTORS.

IF THE RIGHTS TO PUBLICLY FINANCED INVENTIONS ARE GIVEN TO CONTRACTORS, THE GOVERNMENT ITSELF WILL BE PROMOTING THE CONCENTRATION OF ECONOMIC POWER IN THE HANDS OF A FEW LARGE CORPORATIONS. AS CONGLOMERATES CONTINUE TO TAKE OVER MORE COMPANIES, THE PROBLEM IS EXACERBATED.

CURRENTLY, THE PRESIDENT AND MANY MEMBERS OF CONGRESS ARE CALLING FOR THE EXPENDITURE OF UNPRECEDENTED SUMS TO DEVELOP NEW SOURCES OF ENERGY AND MORE EFFICIENT WAYS OF USING IT. BY FAR, THE VAST MAJORITY OF THESE FUNDS WILL BE SPENT UNDER CONTRACTS WITH LARGE CORPORATIONS.

IMAGINE THE PUBLIC FUROR THAT WOULD ENSUE IF, UNDER THE TERMS OF THIS BILL, A CONTRACTOR, EITHER LARGE OR SMALL, DEVELOPED AT PUBLIC

EXPENSE A MAJOR BREAKTHROUGH IN ENERGY TECHNOLOGY. IS IT PROPER FOR THAT COMPANY TO BE ABLE TO EXERCISE MONOPOLY RIGHTS OVER THE DISTRIBUTION, USE, AND PRICING OF THE RESULTS FOR 17 YEARS? I THINK NOT. THE RIGHTS TO INVENTIONS DEVELOPED AT PUBLIC EXPENSE SHOULD BE VESTED IN THE GOVERNMENT AND MADE AVAILABLE FOR USE BY ANY U.S. CITIZEN.

THE BILL CONTAINS PROVISIONS THAT APPEAR TO BE SAFEGUARDS, BUT ARE NOT. WHILE CREATING AN IMPRESSION THAT THE BILL IS NOT COMPLETELY ONE-SIDED IN FAVOR OF THE CONTRACTORS, THEY DO NOTHING TO PROTECT THE PUBLIC.

THE BILL PROVIDES THAT IF A CONTRACTOR WHO HOLDS TITLE TO A GOVERNMENT FINANCED INVENTION FAILS TO DEVELOP AND PROMOTE IT, OR CREATES A SITUATION INCONSISTENT WITH THE ANTI-TRUST LAWS, THE GOVERNMENT CAN FORCE WIDE-SPREAD LICENSING OR REVOKE THE CONTRACTOR'S PATENT OR LICENSE. HOWEVER, THE GOVERNMENT HAS HAD ESSENTIALLY THESE SAME RIGHTS SINCE 1963, BUT TO MY KNOWLEDGE HAS NEVER USED THEM. THERE IS NO REASON TO EXPECT FEDERAL AGENCIES TO DO SO NOW. IF A GOVERNMENT AGENCY EVER DECIDED TO EXERCISE THESE "MARCH-IN" RIGHTS AND THE PATENT HOLDER CONTESTED THE ACTION, THE CONTRACTOR COULD STRETCH OUT LITIGATION FOR YEARS WHILE CONTINUING TO BENEFIT FROM THE PATENT.

THE PROVISION UNDER WHICH THE GOVERNMENT WOULD SHARE ROYALTIES AND REVENUES WITH THE CONTRACTOR IS ALSO A FACADE. SINCE THERE ARE NO FIRM STANDARDS FOR CALCULATING THE COST FIGURES, THE LIKELIHOOD OF MANIPULATION AND DISPUTES IS GREAT. MOREOVER, THERE ARE AMPLE LOOPHOLES FOR EXEMPTIONS.

THE BILL REQUIRES THAT, PRIOR TO GRANTING EXCLUSIVE OR PARTIALLY EXCLUSIVE LICENSES TO PATENTS THE GOVERNMENT ALREADY OWNS, THE AGENCY MUST CERTIFY THAT THE INVENTION WOULD NOT OTHERWISE BE USED

AND THAT THE LICENSE WILL BE LIMITED TO A PARTICULAR FIELD. THE PREMISE OF THIS BILL IS THAT INVENTIONS ARE NOT USED UNLESS SOMEONE HAS MONOPOLY RIGHTS. THEREFORE IF THIS BILL BECOMES LAW, I AM CONFIDENT GOVERNMENT OFFICIALS WOULD MAKE THE REQUIRED DETERMINATION ROUTINELY AND BY SO DOING GRANT MONOPOLY RIGHTS FOR MOST OF THE PATENTS THE GOVERNMENT NOW OWNS.

IN MY OPINION, THESE SO-CALLED SAFEGUARDS WOULD BE ADMINISTRATIVELY CUMBERSOME, INEFFECTIVE, AND ARE LARGELY COSMETIC. TO COMPLY WITH THE PROVISIONS OF THIS BILL, FEDERAL AGENCIES WOULD HAVE TO SET UP ORGANIZATIONS, ISSUE AND IMPLEMENT REGULATIONS, PROMOTE PATENTS, INTERVENE WHEN THESE PLANS ARE NOT CARRIED OUT, NEGOTIATE AGREEMENTS, AND AUDIT BOOKS AND RECORDS. EVEN IF AGENCIES COULD CARRY OUT ALL THESE REQUIREMENTS, WHICH I DOUBT, THE FACT REMAINS THAT GIVING MONOPOLY RIGHTS TO PUBLICLY FINANCED INVENTIONS WOULD UNDULY ENHANCE THE POSITION OF LARGE CONTRACTORS.

THIS BILL IS BUT ONE OF MANY INTRODUCED IN RECENT YEARS DESIGNED TO GIVE CONTRACTORS TITLE OR EXCLUSIVE RIGHTS TO THE INVENTIONS DEVELOPED UNDER THEIR GOVERNMENT CONTRACTS. THE RATIONALE FOR THESE BILLS HAS VARIED. IN THE PAST, THE PROPONENTS HAVE STRESSED THE IDEA THAT COMPANIES WILL NOT ACCEPT GOVERNMENT CONTRACTS UNLESS THEY ARE GUARANTEED EXCLUSIVE PATENT RIGHTS. TODAY THEY CONTEND THAT GIVING AWAY PATENT RIGHTS TO PUBLICLY FINANCED INVENTIONS WILL STIMULATE TECHNOLOGICAL INNOVATION. IF THIS BILL IS NOT ENACTED, I EXPECT THEY WILL COME UP WITH ANOTHER RATIONALE.

IN SUMMARY, I BELIEVE THAT INVENTIONS PAID FOR BY THE GOVERNMENT SHOULD BELONG TO THE PUBLIC, AND ALL CITIZENS SHOULD HAVE AN EQUAL OPPORTUNITY TO USE THESE INVENTIONS. CONTRACTORS, PARTICULARLY LARGE CONTRACTORS SHOULD NOT BE ABLE TO GET A 17 YEAR MONOPOLY ON INVENTIONS THEY DEVELOP WITH TAX DOLLARS. I BELIEVE THE EFFECTS

OF GOVERNMENT PATENT POLICY ARE CONTINUALLY EXAGGERATED AND OVER-EMPHASIZED BY THE PATENT LAWYERS AND CONTRACTORS WHO HAVE A VESTED INTEREST IN THE MATTER. PROPOSED CHANGES REGARDING OWNERSHIP AND USE OF PATENTS DEVELOPED AT GOVERNMENT EXPENSE ARE ALWAYS PRESENTED UNDER THE BANNER OF HIGH SOUNDING PRINCIPLES AND PURPOSES. HAVING OBSERVED THIS ISSUE FOR MANY YEARS, I AM THOROUGHLY CONVINCED THAT ALMOST ALL OF SUCH PROPOSED CHANGES ARE CONTRARY TO THE BEST INTERESTS OF THE UNITED STATES.

THE BASIC PRINCIPLE EMBODIED IN PRESENT LAWS IS THAT THE GOVERNMENT SHOULD HAVE TITLE TO INVENTIONS DEVELOPED WITH GOVERNMENT FUNDS. THE REASONS THE GOVERNMENT SHOULD TAKE TITLE TO THESE INVENTIONS ARE PRIMARILY TO PRECLUDE THE ESTABLISHMENT OF A PRIVATE MONOPOLY FOR A PUBLICLY-FINANCED INVENTION, TO ENSURE THE PUBLIC HAS EQUAL ACCESS TO THESE INVENTIONS, AND TO ENSURE THE GOVERNMENT IS NOT SUBSEQUENTLY BARRED FROM USING THE IDEA BY SOMEONE ELSE'S PATENT. THESE ARE SOUND REASONS THAT I FULLY SUPPORT. THE BASIC PRINCIPLE OF TITLE IN GOVERNMENT SHOULD BE MODIFIED, WAIVED, OR OTHERWISE TAMPERED WITH ONLY FOR COMPELLING REASONS -- AND EVEN THEN WITH GREAT CARE AND IN THE MOST LIMITED WAY NEEDED TO ACCOMPLISH THE PURPOSE.

THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY.

STATEMENT OF
ADMIRAL H.G. RICKOVER, USN
BEFORE THE SENATE ARMED SERVICES COMMITTEE
AND
THE JOINT ECONOMIC COMMITTEE

ON

INDEPENDENT RESEARCH AND DEVELOPMENT

ON

SEPTEMBER 29, 1975

OPENING STATEMENT

Mr. Chairman, you have asked me to testify before this joint session of the Senate Armed Services Committee and the Joint Economic Committee on the topic of independent research and development. I know of no area of defense procurement that is more in need of Congressional attention and action. We are devoting scarce Government funds on a program that is, in my opinion, ill-founded and wasteful. For convenience, I will refer to independent research and development and bid and proposal expense as IR&D since the distinction as to which category the work falls into is largely a matter of semantics.

Over the years, defense contractors have vigorously defended the IR&D program on the basis that they must develop new concepts to be able to compete in the defense market; that companies are most innovative when they are free to explore promising ideas without Government interference.

They conclude that IR&D is a necessary business expense which benefits the Government and which therefore should be recognized and reimbursed by the Government, but with rights to technical data and inventions to be retained by them.

Some of these arguments might have more validity if there were true competition in defense procurement. However, the vast majority of defense procurement is actually non-competitive, with only a few large firms competing for major weapon systems because of the large amount of technical, financial, and productive resources required. Even when more than one firm is capable, prior experience, shop loading, or other factors can effectively insulate the successful bidder against competitive pressures.

One of the problems with IR&D--the lack of incentive to control costs--stems from this situation. When there is no true competition, prices are based on the actual costs incurred and these costs generally can be passed on to the Government. Thus, contrary to what industry spokesmen might claim, the Government cannot safely rely on competition in the marketplace to ensure IR&D expenditures are reasonable.

The Defense Department exercises practically no surveillance over IR&D expenditures. These IR&D costs are charged through overhead. Thus, at predominantly defense oriented plants, the Government ends up paying most, or sometimes all, IR&D costs. Yet, the Government has no say in how the money is spent. Therefore, we have developed a system where public funds are spent without proper accountability.

Today the Defense Department is having increasing difficulty obtaining the funds necessary for national defense. After lengthy study, the General Accounting Office concluded that it could not determine whether the benefits to the Government from contractors' IR&D efforts are worth the cost to the Government. From my experience in charge of a major defense program, I believe the IR&D program is a waste of taxpayers' money.

Here are some of the important considerations which determine my belief.

COST OF IR&D

IR&D costs have increased as a percentage of total defense sales from 2.73% in 1968 to 3.73% in 1974. In fiscal year 1974, the Defense Department reported IR&D expenditures of $808 million. These reported figures are significantly less than the amount actually spent because they cover only 90 of the largest defense contractors. The total figure for all contractors probably exceeds $1 billion.

Year after year, before the budget request is submitted to Congress the Navy has had to eliminate important submarine research and development projects due to a shortage of funds. Congress then makes even further cuts. In fiscal year 1973, for example, Congress cut the DOD research and development budget more than $800 million. In FY 1974, Congress cut more than $400 million, and in FY 1975 nearly $800 million. When actual defense needs are not funded, why should we spend up to a billion dollars a year financing IR&D projects, because of the vague hope that someday something of value will result?

IMPACT ON COMPETITION

Rather than enhancing competition, as large defense contractors claim, IR&D actually inhibits competition. Since the largest defense contractors generally receive the largest IR&D payments, this helps them to perpetuate their dominant position in the market. Furthermore, these contractors can charge Government contracts for developments they hope to exploit in their commercial business. Obviously, the smaller the company, the less advantage it gets from IR&D.

Here is an example. At a shipyard where about 99 percent of the work is being done for the Navy, the company charged us over $500,000 for "bid and proposal expenses." This was related to the development of a large, nuclear-powered commercial submarine tanker to transport oil under the Arctic ice cap. This was strictly a commercial proposition; it had absolutely no military value. In fact, the company could not have undertaken the project without the expertise acquired in the performance of Navy work. Yet the company took the position that the Navy would benefit from the work and should pay its design and engineering costs. The company has taken its case to the Armed Services Board of Contract Appeals where a decision is pending.

What bothers me is this: Why should the Department of Defense subsidize commercial developments when it is unable or unwilling to fund military submarine research and development projects?

PROMOTING A MODERN INDUSTRY TECHNOLOGY BASE

Large defense contractors argue that IR&D is necessary to keep an up-to-date and modern industrial technology base for defense needs. But the grant of large IR&D subsidies to large defense contractors, smaller subsidies to smaller defense contractors, and no subsidies at all to firms without defense contracts does not broaden the industrial base. In fact, it narrows it. The Defense Department's IR&D payments help only those firms which already have defense contracts. Firms that desire to enter the defense market must find another source of financing.

The Department of Defense already makes a substantial contribution to maintaining a modern industrial technology base throughout American industry--without IR&D. From what I have seen, the flow of ideas and technology from Department of Defense-funded major weapon systems contracts to non-defense areas far exceed the ideas and technology the contractor brings to the job from non-defense work.

BENEFITS FROM IR&D

For the past several years, defense contractors and the Defense Department have been trying to collect examples of innovations under the IR&D program. By now, they have impressive lists showing that work performed under IR&D was "instrumental to this program," or "led to the development of that piece of equipment." IR&D is frequently cited as a contribution to the success of laser development, the Huey helicopter, integrated circuits, and so on. But, I could name hundreds of actual, not claimed, improvements in nuclear plant technology which resulted from direct Navy or AEC funded research and development. The issue is not whether discoveries have been made under IR&D, but whether the Defense Department can afford to pay a billion dollars annually for contractors to spend as they see fit, in hopes that our defense will at some future unspecified date benefit directly or indirectly from such expenditures.

IR&D AS A NORMAL BUSINESS EXPENSE"

Defense contractors argue that IR&D costs are as legitimate as rent, heat, light, maintenance and the like. This is not a valid comparison. There is no incentive for a contractor to waste heat or light. However, increased IR&D spending can enhance the company's profits and strengthen its market position, military and commercial. When major defense firms face declining sales, they can use IR&D in any way they wish, and with no strings attached, to pay the salaries of engineers and other technical employees not needed on other work.

RIGHTS TO INVENTIONS, PATENTS, AND TECHNICAL DATA

Under the IR&D program the Defense Department gives away all rights to inventions, patents, and technical data, even though the Government may pay for most of the work. If the DOD wants to use an invention financed under IR&D, the contractor may extract a royalty. One contractor developed at Government expense and patented an automatic welding machine. This was then marketed to defense suppliers and to Government installations. As it turned out, the Government paid not only for developing the invention but also royalties for the right to use it on Government work.

In my view, the Government should insist on rights to the technology it finances. If, as contended, the Government destroys a company's incentive to innovate by acquiring rights to patents, inventions, and technical data, why is it proper to have a double standard wherein companies do not grant rights to their employees and subcontractors for new concepts that are developed on the job?

DOD ADMINISTRATION OF IR&D

In an attempt to establish some semblance of control over IR&D expenditure, Congress has required the Defense Department to set, in advance, annual ceilings on the maximum amount of a contractor's IR&D that the Department will reimburse. Congress also requires that IR&D projects, to be allowed, must have a potential military relationship. But these controls are not effective.

When the Defense Department's annual share of a contractor's IR&D exceeds $2 million, the Department negotiates an advance IR&D ceiling agreement with the contractor. However, in these negotiations, the Defense negotiators are in a weak bargaining position. Large contractors can hold out for a higher ceiling amount and usually get it.

Four years ago, a large defense contractor refused to agree to an IR&D ceiling that the contracting officer considered reasonable. The contractor insisted on a higher amount and in the Court of Claims challenged the Government's right to set the lower figure. The matter is still pending.

Although negotiations to establish IR&D ceiling amounts are based on technical review of the IR&D proposals, the process is largely "brochuremanship." Defense personnel review the contractor's IR&D submittals and briefings and comment on them. These evaluations, however, have little or no impact on how much IR&D will be handed out.

Those who conduct the reviews for the Government have no incentive to challenge the projects or amounts. Unless Government reviewers can prove that a project has no "potential military relationship," the cost of the project is allowed. Projects have been accepted such as development of sewage treatment systems for coin operated laundries; energy studies for heating high rise buildings; and the development of home appliances. These were considered as having a potential military relationship.

I cannot envision a project that could not be defended as having a potential military relationship. What is to prevent a turbine manufacturer from studying fruit flies since fruit is eaten by the piccolo player of a military band? What if the contractor decides to develop a new blend of coffee--obviously this would have a potential relationship with the eating habits of the military. Under the current IR&D program, the Government is committed to supporting any new venture a defense contractor decides to undertake.

Even if an IR&D project were challenged as a result of technical review, determinations that it does not have a potential military relationship cannot be made without the prior approval by the Office of the Director of Defense Research and Engineering. Even if the challenge were sustained, this rarely would effect the amount of IR&D the Defense Department pays. Any amount so disallowed is considered as included in the costs allocated to non-defense work.

As you can see, the technical reviews have not been effective. In the words of the Comptroller General, "Our studies have found that the PMR (potential military relationship) has had no effect on DOD's reimbursement of contractors' costs."

So far I have been discussing the situation where the Defense Department's annual share of a company's IR&D is $2 million or more. Where the Department pays less than $2 million, the ceiling is set as a percentage of the company's prior year IR&D expenditures. Also, there is then no requirement for technical review of the work to be performed--the costs are automatically accepted.

Thus, while there may appear to be a degree of control over IR&D as a result of past Congressional directives, there is not. The safeguards are largely cosmetic.

IMPACT ON NATIONAL DEFENSE

The argument has been made that the Soviet Union is spending twice as much on research and development as the United States in an effort to close a technological gap that developed because of the superiority of the free enterprise system; that IR&D helps finance the ingenuity and innovations which have contributed so much to the success of the free enterprise system; and that therefore continued Government support of IR&D is essential. The impression is left that IR&D helps us hold our lead in technology despite mounting expenditures by the Soviets.

It is dangerous to think that the United States can maintain indefinitely a technological lead over countries that are willing to devote substantially more resources to the task, regardless of their political or economic system. In my view, the fact that the Soviets are spending far more than we are for research and development is all the more reason to spend our limited funds in areas that are most likely to be profitable from a technological standpoint.

Elimination of Defense Department support for IR&D would not mean the end of technological breakthroughs. Nor would it cause the United States to become a second rate research and development country. Prior to 1960, the Department of Defense had a firm policy limiting IR&D. The Atomic Energy Commission followed a policy of allowing independent research and development costs only when such costs were specifically provided in the contract, and only to the extent that such work benefited the basic contract work. When the Commission did participate in a contractor's independent research program, it obtained for the public the rights to technical data and inventions commensurate with the Government's investment. That policy did not impede the development of atomic energy. Neither do I believe that elimination of IR&D would impede national defense.

SUMMARY

Obviously, some beneficial ideas have resulted from independent research and development. However, we are faced with the need to make decisions in a climate of limited funds. A philanthropist might donate large sums to enable individuals or organizations to pursue their personal interests. But an ordinary citizen with limited income must conserve funds by spending his money where it will benefit him directly. Since philanthropy is not in the Defense Department's charter, I believe it should confine its spending for research and development to specific projects where companies and individuals can be held accountable for expenditures and results. In this way, Congress could also properly exercise its oversight function over IR&D expenditures--something the Congress is presently not doing. If it is considered that private research warrants public support on a basis other than military needs, such support should be authorized by Congress, and administered on that basis, not hidden in the price of defense contracts.

The current IR&D program does not provide benefits to the Government anywhere near the cost. It is a subsidy the Government can no longer afford. Nor is the nation served by the further concentration of economic power in the hands of a few large defense contractors, which the present policy assists.

RECOMMENDATIONS

1. The present system of DOD payments for independent research and development and bid and proposal expenses should be eliminated.

2. The Department of Defense should allow costs of independent research and development projects only when such costs are specifically provided in the contract and then only to the extent such work benefits the contract work itself.

3. The Department should receive, in the name of the Government, patent and data rights commensurate with costs financed by the Government on independent research and development projects.

4. In cases where company proposed research and development projects have sufficient benefit to warrant the cost, the Department should finance the work by direct contract, rather than through IR&D. Responsible Government officials would supervise the work, as they are supposed to for all work the Government undertakes.

5. If federal subsidies of private independent research and development are necessary in other areas, such subsidies should be administered by the appropriate Government agency which has expertise in that area. Subsidization would then be aboveboard and measurable by Congress. Appropriate controls could be established to preclude concentration of

technology among a few favored industries; to provide adequate direction over the work; and to ensure the Government retained rights to work financed with public funds.

CONCLUSION

The present situation with respect to IR&D is in effect "taxation without representation." Congress has, in essence, delegated its rights and duties under the Constitution to Defense officials. There is little surveillance by the Department or by Congress of these large expenditures. Appointed Defense officials are under no constraints as to the amount that can be approved.

Just think how popular you can become with contractors when you have a billion dollars to give away with no strings attached. To put this into perspective, I remember from my high school days that the entire federal budget in 1916 was about $700 million.

I contrast this easy way of spending money with the one I have to face when I ask for hard-to-get, relatively small sums for research and development from the very same people who approve the IR&D. And when they agree, the request must still be justified and defended before the authorizing and appropriations committees of Congress.

The recipients of IR&D largesse do not have these problems. They can simply initiate a program and charge the cost to Government contracts, without justifying the expenditure to the Defense Department, to Congress, or to anyone else. Defense contractors contend that their reimbursement is subject to ceilings set by the Defense Department. But if they can persuade Defense officials to accept a higher ceiling, they can get it.

It is inevitable that favoritism may enter into such a practice. Yet no one could ever be proved guilty of wrongdoing because the amounts approved are left entirely to the judgment of those in charge.

I sometimes wonder what the ordinary citizen, who has to labor in making out his income tax, would think if he knew and understood this strange system of handing out government funds. He might even wonder why he also is not given some of the free money, when it is so readily given to large defense contractors.

How do you suppose he would vote on this issue were he to have the opportunity?

Mr. Chairman, I deeply appreciate the opportunity to present my views on this subject to your two committees.

THIS STATEMENT REFLECTS THE VIEWS OF
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
THE NAVY OR THE DEPARTMENT OF THE NAVY

OPENING REMARKS
OF
ADMIRAL H.G. RICKOVER
BEFORE
THE SENATE GOVERNMENTAL AFFAIRS COMMITTEE

AUGUST 20, 1980

CONSULTANT REFORM ACT OF 1980

THANK YOU FOR INVITING ME TO TESTIFY ON S. 2880, A BILL AIMED AT ELIMINATING ABUSES THAT HAVE BEEN BROUGHT TO LIGHT BY THIS COMMITTEE, THE GENERAL ACCOUNTING OFFICE, AND OTHERS, REGARDING THE GOVERNMENT'S USE OF CONSULTANTS. AMONG THESE ABUSES ARE:

A. CONTRACTING FOR USELESS OR UNNECESSARY WORK.

B. SHOWING FAVORITISM IN THE AWARD OF CONTRACTS -- PARTICULARLY IN CONTRACTS TO FORMER GOVERNMENT EMPLOYEES.

C. USING CONSULTANTS TO PERFORM AGENCY FUNCTIONS OR TO CIRCUMVENT AGENCY PERSONNEL CEILINGS.

D. COMMISSIONING STUDIES TO BUY TIME WHILE CREATING AN IMPRESSION OF ACTION.

E. PAYING EXCESSIVE RATES FOR CONSULTANTS.

These problems are not new. I observed many of them before World War II when I first came to Washington to run the Bureau of Ships electrical section. Even in those days there were self-proclaimed experts with impressive credentials who could be hired to perform studies and give advice. After a few encounters with these so-called "experts", I decided I would be much better off taking advantage of and, where necessary, developing in-house Government expertise to provide the supervision and technical direction for my programs.

I now limit contracts under my cognizance to bona fide equipment manufacturers and shipbuilders, for research and development, design, production, and maintenance work. My programs depend heavily on input from such manufacturers. I do not use the services of the so-called "think tanks" or consulting firms.

I am not saying that all consulting firms are incompetent, or that all consulting contracts are unnecessary or wasteful. Once in a great while a short term need for specialized knowledge and expertise might be best filled by a consultant. I can conceive that consulting firms may be useful to help with the work of some civilian agencies, for example, in gathering data or conducting statistical surveys.

In the Defense Department, however, there has been a rapid growth in the use of consultants as a result of increased workloads, personnel hiring restrictions, and easy access to consulting services. Many consultants are friends or former co-workers of Defense Department employees. In my opinion, vast sums are being wasted through consulting contracts. Moreover, in terms of delay and inefficiency the true

COST TO THE GOVERNMENT OF USELESS STUDIES AND EXCESSIVE USE OF CONSULTANTS FAR EXCEEDS THE CONTRACT AMOUNTS.

THE USE OF CONSULTANTS OFTEN IMPEDES, RATHER THAN FACILITATES, ACTION BY GOVERNMENT AGENCIES. FOR THE PAST TWO DECADES CONSULTANTS AND SYSTEMS ANALYSTS HAVE ENDLESSLY STUDIED AND DEBATED THE RELATIVE MERITS OF NUCLEAR AND NON-NUCLEAR SHIPS, AND THE PROPER COMPOSITION OF OUR FUTURE NAVY. CONTRACTS FOR STUDIES FREQUENTLY WASTE THE TIME OF AGENCY PERSONNEL WHO OFTEN MUST EDUCATE THE SO-CALLED EXPERTS DOING THE STUDY, ASSIST THEM IN GATHERING THE DATA, AND THEN RESPOND TO THEIR REPORTS AND RECOMMENDATIONS - WHICH OFTEN DEFY COMMON SENSE.

STUDIES HAVE BEEN CONDUCTED IN ATTEMPTS TO PROVE THAT NON-NUCLEAR AIRCRAFT CARRIERS AND CRUISERS ARE AS EFFECTIVE AS, BUT CHEAPER THAN, NUCLEAR POWERED CARRIERS AND CRUISERS; THAT, IN RESPONSE TO THE SOVIET UNION BUILDING FASTER SUBMARINES WE SHOULD BUILD SLOWER SUBMARINES; THAT WE SHOULD ONCE MORE CONSIDER BUILDING DIESEL POWERED SUBMARINES; AND SO ON. SOME YEARS AGO ONE DEFENSE DEPARTMENT STUDY CONCLUDED IT WOULD BE COST EFFECTIVE TO SINK 10 OF OUR POLARIS SUBMARINES.

EACH YEAR THERE IS CONTROVERSY IN THE DEPARTMENT OVER THE SHAPE OF THE NAVY'S FUTURE SHIPBUILDING PROGRAMS. OFTEN THE CONCESSION TO THOSE WHOSE PROGRAMS ARE CUT BACK IS A PROMISE TO CONDUCT "FURTHER STUDIES." AS A CONSEQUENCE, THE NAVY'S LONG RANGE SHIPBUILDING PROGRAM HAS FOR YEARS BEEN IN TURMOIL.

ANOTHER PROBLEM WHICH RESULTS FROM EXCESSIVE USE OF CONSULTANTS IS THAT THE SKILLS AND MOTIVATION OF GOVERNMENT PERSONNEL TEND TO ATROPHY. WHERE CONSULTANTS PREPARE THE GOVERNMENT'S LONG RANGE

PLANS AND BUDGETS, DRAFT CONTRACTS, PREPARE RESPONSES TO CONGRESS, AND THE LIKE, THE GOVERNMENT PEOPLE BECOME MERE FIGUREHEADS, AVOIDING THE HARD THINKING AND THE "DIRTY DETAILS." AS A RESULT, GOVERNMENT PROJECT OFFICERS AND CONTRACTING OFFICERS WHO RELY ON CONSULTANTS TO DRAFT THEIR CONTRACTS ARE OFTEN POORLY EQUIPPED TO NEGOTIATE AND ADMINISTER THEM. IN A RECENT CASE, AN ASSISTANT SECRETARY OF THE NAVY HIRED CONSULTANTS TO PREPARE A REPORT OF THE NAVY'S SHIP PROCUREMENT PROCESS. THE NAVY COMMAND RESPONSIBLE FOR SHIP PROCUREMENT THEN HIRED CONSULTANTS, INCLUDING A FIRM INVOLVED IN WRITING THE REPORT, TO DRAFT THE NAVY'S RESPONSE.

WITH VIRTUALLY UNLIMITED PERSONNEL RESOURCES AVAILABLE FROM CONSULTING FIRMS, GOVERNMENT OFFICES HAVE UNDERTAKEN MARGINAL WORK THEY WOULD OTHERWISE HAVE NOT DONE. ONCE UNDER CONTRACT, AGGRESSIVE CONSULTANTS CAN SOMETIMES TURN THESE MINOR OR UNIMPORTANT JOBS INTO MAJOR PROJECTS RESULTING IN FOLLOW-ON CONTRACTS AND ADDITIONAL PROFITS.

PROBABLY THE BEST WAY TO CUT DOWN ON WASTE IN THE CONSULTING BUSINESS IS TO REDUCE DRASTICALLY THE FUNDS AVAILABLE FOR THIS PURPOSE AND TO MAKE THEM MORE VISIBLE THROUGHOUT THE BUDGET PROCESS. THIS IS PARTICULARLY IMPORTANT IN THE CASE OF LARGE DEFENSE PROGRAMS WHERE THE VAST SUMS BEING GIVEN TO CONSULTANTS ARE HIDDEN IN THE TOTAL PROGRAM COST.

IN ADDITION, CONGRESS SHOULD MAKE IT DIFFICULT FOR GOVERNMENT AGENCIES TO CONTRACT WITH CONSULTANTS. AGENCIES TEND TO USE CONSULTANTS EXCESSIVELY MAINLY BECAUSE FUNDS FOR THIS PURPOSE ARE READILY AVAILABLE TO LARGE NUMBERS OF GOVERNMENT EMPLOYEES, AND

CONSULTING CONTRACTS ARE EASY TO AWARD. FOR THESE REASONS, APPROVAL LEVELS FOR SUCH CONTRACTS SHOULD BE SET HIGH IN THE CHAIN OF COMMAND, PREFERABLY AT THE SECRETARIAL LEVEL, TO REDUCE THE LIKELIHOOD OF "MAKE-WORK" PROJECTS AND FAVORITISM.

EXISTING FEDERAL STATUTES AND DEFENSE PROCUREMENT REGULATIONS APPEAR TO SET STRICT LIMITS ON THE HIRING AND PAY OF CONSULTANTS. THERE ARE PROHIBITIONS AGAINST USING CONSULTANTS TO PERFORM DUTIES WHICH COULD BE PERFORMED BY REGULAR EMPLOYEES; TO AVOID PERSONNEL HIRING REQUIREMENTS; OR TO CIRCUMVENT CIVIL SERVICE PROCEDURES AND PAY LIMITATIONS.

BUT THESE RESTRICTIONS ARE EASILY CIRCUMVENTED. THE DEFENSE PROCUREMENT REGULATIONS, FOR EXAMPLE, POINT OUT THAT BY STATUTE THE MAXIMUM RATE OF PAY FOR INDIVIDUAL CONSULTANTS OR EXPERTS CANNOT EXCEED THE TOP RATE OF THE CIVIL SERVICE PAY SCALE. BUT THESE LIMITS DO NOT APPLY IN CASES WHERE THE GOVERNMENT CONTRACTS WITH A COMPANY FOR SPECIFIC TASKS. AS A RESULT, FORMER GOVERNMENT EMPLOYEES AND OTHERS WHO WANT TO BE PAID MORE THAN THE LAW PRESCRIBES FOR INDIVIDUAL CONSULTANT AGREEMENTS, JOIN CONSULTING FIRMS.

IN RECENT MONTHS, THE PRESIDENT, THROUGH THE OFFICE OF MANAGEMENT AND BUDGET, HAS DIRECTED GOVERNMENT AGENCIES TO TIGHTEN THEIR CONTROLS OVER CONSULTING CONTRACT PROCEDURES. HOPEFULLY THIS WILL RESULT IN IMPROVEMENT. HOWEVER, HISTORY HAS SHOWN THE NEED FOR MORE PERMANENT SAFEGUARDS. THE BILL YOU ARE CONSIDERING TODAY, S. 2880, IS A STEP IN THE RIGHT DIRECTION. HOWEVER, TO BE EFFECTIVE IT SHOULD BE STRENGTHENED SUBSTANTIALLY.

I HAVE THE FOLLOWING COMMENTS AND RECOMMENDATIONS:

1. THE BILL'S PROVISIONS SHOULD BE DIRECTED SPECIFICALLY AT CONSULTING CONTRACTS, AS THE TITLE "CONSULTANT REFORM ACT OF 1980" SUGGESTS, RATHER THAN ALL CONTRACTS. THE PROBLEMS WHICH NEED TO BE ADDRESSED ARISE PRIMARILY WITH THE AWARD OF CONSULTING CONTRACTS TO PERFORM STUDIES, PROVIDE ADVICE, OR PERFORM PAPERWORK JOBS AND ADMINISTRATIVE SERVICES FOR THE GOVERNMENT AGENCIES. APPLYING THE PROVISIONS OF S. 2880 TO CONTRACTS SUCH AS THOSE FOR RESEARCH AND DEVELOPMENT; DESIGN, PRODUCTION, MAINTENANCE, OR OPERATION OF HARDWARE; HOUSEKEEPING SERVICES; SUPPLY CONTRACTS AND THE LIKE, WILL CAUSE UNNECESSARY PAPERWORK, DELAY DAY-TO-DAY WORK, AND MASK THE CONSULTING ABUSES WHICH SHOULD BE THE FOCUS OF THE BILL.

2. I AGREE WITH THE REQUIREMENT TO PUBLICIZE PROPOSED CONSULTING CONTRACTS IN EXCESS OF $10,000 IN THE COMMERCE BUSINESS DAILY. THIS WILL CLOSE A LOOPHOLE IN EXISTING REGULATIONS WHICH COULD BE INTERPRETED AS EXEMPTING CONSULTING CONTRACTS FROM THE REQUIREMENTS TO PUBLICIZE. BUT THIS REQUIREMENT WILL NOT DO MUCH TO PREVENT ABUSES. FEW WILL BE ABLE TO DISCERN FROM SKILLFULLY WORDED PUBLIC ANNOUNCEMENTS WHETHER CONTRACTS ARE REALLY NECESSARY, OR WHETHER THEY STEM FROM SPECIAL RELATIONSHIPS BETWEEN CONSULTANTS AND THEIR GENEROUS CLIENTS. IT IS ALL TOO EASY FOR THOSE CHARGED WITH SPENDING MONEY THAT IS NOT THEIR OWN TO BE GENEROUS.

IF THE PURPOSE OF SUCH A REPORTING REQUIREMENT IS TO ENHANCE COMPETITION FOR CONSULTING CONTRACTS, YOU SHOULD BEAR IN MIND THAT MANY CONSULTING CONTRACTS ARE AWARDED ON A COST REIMBURSEMENT BASIS WITH LITTLE OR NO OBJECTIVE CRITERIA FOR JUDGING CONTRACTOR PERFORMANCE EITHER BEFORE OR AFTER THE FACT. IN THESE CASES, THE

TRADITIONAL BENEFITS OF COMPETITIVE BIDDING ARE LARGELY LOST.

3. S. 2880 PROPOSES TO BROADEN PUBLIC ACCESS TO GOVERNMENT CONTRACT FILES AND AMEND THE FREEDOM OF INFORMATION ACT TO PROVIDE ACCESS TO CONTRACTOR DATA DEVELOPED UNDER GOVERNMENT CONTRACTS. I CONSIDER THAT PUBLIC ACCESS TO CONTRACT DATA ALREADY ALLOWED UNDER THE FREEDOM OF INFORMATION ACT SHOULD NOT BE BROADENED. THE DISADVANTAGES WOULD FAR OUTWEIGH THE ADVANTAGES. NOT MANY CITIZENS WILL BE WILLING OR ABLE TO FERRET OUT CONSULTING CONTRACT ABUSES BY GOING THROUGH GOVERNMENT OR CONTRACTOR FILES. THOSE WHO WOULD BENEFIT MOST FROM THE PROPOSED PROVISION ARE CLAIMS LAWYERS AND OTHERS WHO ALREADY HAVE SEIZED UPON THE FREEDOM OF INFORMATION ACT AS A VEHICLE WITH WHICH TO HARASS THE GOVERNMENT. UNDER THIS ACT THEY ALREADY OBTAIN INFORMATION THEY COULD NOT OTHERWISE OBTAIN ABOUT THEIR COMPETITORS, AS WELL AS DATA WITH WHICH TO DEVISE A BASIS FOR BID PROTESTS OR LAWSUITS AGAINST THE GOVERNMENT. FURTHER, MAKING ALL DATA GENERATED UNDER GOVERNMENT CONTRACTS SUBJECT TO THE FREEDOM OF INFORMATION ACT WOULD PLACE SOME CONTRACTORS IN THE POSITION OF HAVING TO DECIDE WHETHER TO FOREGO GOVERNMENT CONTRACTS OR RISK THE DISCLOSURE OF PROPRIETARY DATA TO COMPETITORS.

4. THE PROVISION THAT WOULD LIMIT PROCUREMENT OBLIGATIONS IN THE LAST TWO MONTHS OF A YEAR TO 20 PERCENT SHOULD APPLY ONLY TO CONSULTING CONTRACTS. IF THIS PROVISION IS APPLIED ACROSS THE BOARD TO ALL PROCUREMENTS, DATA ON LAST MINUTE CONTRACTING FOR CONSULTANTS WOULD BE LOST IN SUMS TOTALING MANY MILLIONS OF DOLLARS FOR OTHER DELAYED PROCUREMENTS.

5. THE REQUIREMENT FOR FORMAL EVALUATION OF CONTRACTOR PERFORMANCE,

AND FOR LISTING DETAILED INFORMATION ON REPORTS GENERATED UNDER CONTRACTS SHOULD APPLY ONLY TO CONTRACTS WITH CONSULTANTS. APPLYING THESE REQUIREMENTS TO ALL CONTRACTS WOULD GENERATE UNNECESSARY PAPERWORK. THE LIST OF REQUIRED REPORTS FOR THE TRIDENT SHIP CONSTRUCTION CONTRACT, FOR EXAMPLE, IS MORE THAN 90 PAGES LONG AND INCLUDES REPORTS FOR SUCH ITEMS AS CONSTRUCTION STATUS, COST, SCHEDULES, WEIGHT, DESIGN SUBMITTALS AND THE LIKE. I SEE NO BENEFIT IN APPLYING THE PROPOSED REQUIREMENTS FOR CONSULTANTS TO OTHER CONTRACTS.

6. THE REQUIREMENT THAT AGENCIES IDENTIFY AND JUSTIFY AMOUNTS IN THEIR BUDGETS FOR CONSULTING CONTRACTS IS A GOOD ONE. I WOULD GO A STEP FURTHER AND REQUIRE THAT SUCH SUMS SHOULD BE REQUESTED BY AGENCIES AND AUTHORIZED BY CONGRESS AS A SPECIFIC LINE ITEM IN THE AGENCY BUDGET.

7. I AGREE WITH THE PROPOSED REQUIREMENT REQUIRING DISCLOSURE OF CONFLICT OF INTEREST SITUATIONS; ALSO SANCTIONS IN CASES WHERE CONTRACTORS DO NOT MAKE TRUTHFUL DISCLOSURES. IN ADDITION, I RECOMMEND THAT ANY COMPANY THAT DOES CONSULTING WORK OR EMPLOYS A SUBCONTRACTOR TO DO CONSULTING WORK SHOULD BE REQUIRED TO DISCLOSE THE NAMES AND PAST AFFILIATIONS OF ANY FORMER GOVERNMENT EMPLOYEES WHO WILL BE USED ON A PROJECT; THE PROPOSED RATE OF PAY FOR HIS SERVICE; AND IN THE CASE OF "UNSOLICITED" PROPOSALS, WHETHER ANY GOVERNMENT OFFICIALS SUGGESTED DIRECTLY OR INDIRECTLY THE SUBMISSION OF THAT PROPOSAL.

8. THE BILL SHOULD REQUIRE THAT ANY CONSULTING CONTRACT IN EXCESS OF $50,000 BE APPROVED, AT A MINIMUM, AT THE ASSISTANT

SECRETARY LEVEL. EACH APPROVING OFFICIAL IN THE CHAIN SHOULD ALSO BE REQUIRED TO CERTIFY THAT HE IS PERSONALLY KNOWLEDGEABLE OF THE WORK TO BE DONE; THAT THE WORK NEEDS TO BE DONE; AND THAT IT CANNOT BE PERFORMED IN-HOUSE.

9. EITHER THE GENERAL SERVICES ADMINISTRATION OR THE OFFICE OF MANAGEMENT AND BUDGET SHOULD BE REQUIRED BY LAW TO ESTABLISH A STANDARD SET OF OFFEROR CERTIFICATIONS AND TERMS AND CONDITIONS. THESE WOULD BE REQUIRED FOR ALL CONSULTING CONTRACTS. AT A MINIMUM THESE SHOULD INCLUDE:

(A) STANDARDS FOR COST CHARGING TO CONSULTANT CONTRACTS.

(B) REQUIREMENTS FOR CONSULTANTS TO CERTIFY THAT THE RATES CHARGED TO THE GOVERNMENT ARE NO HIGHER THAN THOSE CHARGED TO THE CONTRACTOR'S MOST FAVORED COMMERCIAL CUSTOMER.

(C) A PROHIBITION AGAINST GOVERNMENT AGENCIES PAYING CONSULTANTS AT A RATE HIGHER THAN THE TOP OF THE CIVIL SERVICE PAY SCALE, EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF THE HEAD OF THE AGENCY.

10. REQUIRE THE INSPECTOR GENERAL OF EACH AGENCY TO REVIEW ANNUALLY THE AGENCY'S USE OF CONSULTING CONTRACTS AND COMPLIANCE WITH APPLICABLE REQUIREMENTS. THE RESULTS SHOULD BE SUBMITTED TO THE OFFICE OF MANAGEMENT AND BUDGET AND TO THE APPROPRIATE CONGRESSIONAL OVERSIGHT COMMITTEE.

I BELIEVE S. 2880, MODIFIED AS I HAVE RECOMMENDED, WILL GO A LONG WAY TOWARD DISCOURAGING MANY OF THE ABUSES WHICH HAVE COME TO LIGHT.

HOWEVER, I MUST NOT CONVEY THE IMPRESSION THAT BY ENACTMENT

OF YOUR LEGISLATION, THE PROBLEMS WILL GO AWAY. THOSE IN THE CONSULTING BUSINESS ARE SHREWD AND HAVE FRIENDS IN GOVERNMENT. THESE GOVERNMENT EMPLOYEES THEMSELVES OFTEN LOOK FORWARD TO ACQUIRING THE FRUITS OF THE CONSULTING CORNUCOPIA, WITH THE ASSISTANCE OF THEIR FRIENDS ALREADY IN THE RACKET.

CONSULTING TO GOVERNMENT TODAY IS AN ENDEAVOR REQUIRING LITTLE RESPONSIBILITY, BUT ASSURES FINANCIAL SUCCESS. YOUR LEGISLATION MAY HINDER THE PROCESS FOR A WHILE, BUT I DOUBT THE ABUSES WILL BE ELIMINATED. AT ANY MOMENT DURING A 24-HOUR DAY ONLY ONE-THIRD OF THE PEOPLE IN THE WORLD ARE ASLEEP; THE OTHER TWO-THIRDS ARE AWAKE AND CREATING PROBLEMS. CONSULTANTS ARE WIDE-AWAKE, CLEVER PEOPLE WHO CAN FERRET OUT WHERE THE MANNA IS, AS THEY HAVE AMPLY PROVED.

For Release 1000 (DST)
Wednesday, April 28, 1971

Statement of
Vice Admiral H. G. Rickover, U.S. Navy
before the
Joint Economic Committee
Congress of the United States
on
Problems in Defense Procurement
Wednesday, April 28, 1971

Mr. Chairman, it is an honor for me to appear before this committee to discuss current problems in defense procurement. I have testified many times in past years about deficiencies in defense contracting and the waste of billions of dollars which has resulted from it. In testifying on defense procurement I express my own views, which as you know, rarely coincide with those of my superiors in the Department of Defense.

First, let me make it perfectly clear that I am deeply concerned about the rapid decline in the military posture of the United States relative to that of our potential adversaries. The weapons systems we must have in order to maintain the strength to defend ourselves are inherently expensive. Therefore it is essential that we conduct our military procurement in a manner which insures the maximum amount of defense for each dollar spent. We simply cannot afford to waste any of the money made available for our defense efforts, since such waste undermines our national security.

My concern stems also from the weakening of our nation as a whole by a procurement system that rewards inefficiency; that applies one set of rules for large, influential contractors and more stringent rules for everyone else; that often ranks the public interest second to contractors' interests. These are, in the end, conditions that could undermine our national institutions and our way of life.

Many current problems in defense procurement stem from the almost amoral way that many business leaders conduct their business and the great influence these business leaders have on the Defense Department's procurement policies. Some senior defense officials formerly held key jobs in industry. Defense officials deal regularly with industry representatives, officially and socially, while the public has no similar forum in which to have its interests represented. Consequently, the industry viewpoint usually prevails in defense procurement.

You invited me here to talk about defense profits. Profits are the obvious starting point for investigating defense procurement. They are the standard of performance and achievement in the business community. Today the businessman who demonstrates acuity in business acquisitions, cash flow, and financial manipulation gets more recognition in the business world than his counterpart who spends his time trying to manufacture high quality products efficiently. Consequently, many large companies today are virtually unmanaged while their officers are busy acquiring new businesses, lobbying for more favorable laws and regulations, or devising new ways to make their actual profits look higher or lower depending on whether they are talking to stockholders, to the customer, or to the Internal Revenue Service. Many corporate officials, particularly in conglomerates, couldn't care less whether they sell manure or missiles so long as they can show a profit.

There are many ways to make profits. A contractor can undertake to improve the management and efficiency of his day to day operations and so produce a product for less cost. To sell a common product, like bread or bolts, in highly competitive markets, a company must constantly strive for greater efficiency in order to stay in business and turn a profit.

Defense business is different, however. Only about 11 percent of the defense procurement budget is awarded under truly competitive conditions. Fifty-seven percent of the defense procurement budget is spent under sole source contracts.

Because of the complexity and high cost of today's military weapons, the Department of Defense is dependent on these contractors. Knowing this, large defense contractors can let costs come out where they will, and count on getting relief from the Department of Defense through changes and claims, relaxations of procurement regulations and laws, government loans, follow-on sole source contracts, or other escape mechanisms. Wasteful subcontracting practices, inadequate cost controls, shop loafing, and production errors mean little to these contractors since they will make their money whether their product is good or bad, whether the price is fair or higher than it should be; whether delivery is on time or late. Such matters are inconsequential to the management of most large defense contractors, since, as with other regulated industries, they are able to conceal the real facts concerning their management ineptitude from the public and from their stockholders, until they stumble finally into the arms of government for their salvation.

For many years now, I have described fundamental deficiencies in defense procurement to this committee and to other committees of Congress. Defense officials concede that there are problems in defense procurement. However, those responsible seem apathetic and unwilling to take corrective steps.

Take defense profits. Contrary to what you might think, defense contractors do not have to account to the Department of Defense, to Congress, or to the public for costs and profits on defense contracts. For years I have recommended that defense contractors and subcontractors should be required to submit a report on each defense order over $100,000, revealing costs and profit in accordance with common standards—just as it is done on income tax returns. The Defense Department refuses to demand this. In deciding whether or not defense profits are too high, it relies instead on generalized studies, industry arguments, and Renegotiation Board reports.

For the most part, the criticisms I have made for the past eight years in my testimony still hold true today. The Department of Defense has been unwilling to correct obvious procurement deficiencies. I would like to illustrate this by showing yo where some of the profit-related issues I raised in the past now stand.

Profits on Defense Contracts

The Department of Defense does not have an effective system to check profits on its contracts. No one knows how much profit defense contractors actually make. The Pentagon doesn't know, the General Accounting Office doesn't know, the Congress doesn't know, the taxpayers don't know. We spend $35 billion or more every year without knowing how much of it goes for profit.

The Defense Department gets cost and profit reports on only part of its contracts. Although last year the Department of Defense spent about $14 billion under firm fixed price contracts, no profit data are collected on these contracts.

In addition, the Defense Department's profit reports do not cover subcontracts, even though about half of the defense procurement outlay ends up in subcontracts. Yet, the GAO report indicates that as a percentage of sales, subcontractors get even higher profits than prime contractors.

Generally, there is not much true competition in subcontracting. My experience is that prime contractors pay little attention to getting the best possible prices for their subcontracts, because subcontract prices can be passed on directly to the government.

In the case of subcontracts, both the prime contractor and the subcontractor get a profit on the same work. Moreover, the subcontractor may in turn subcontract some of his work to another contractor, a "second tier" subcontractor. Thus the total amount of profit actually paid on a defense contract is much higher than the profit paid just to the prime contractor. But the Defense Department's profit reporting system records only the prime contractor's profit—and in many cases, not even that.

In the absence of an effective profit reporting system, the Department of Defense has conducted studies to try to determine what profits defense contractors really make. The first studies were conducted by the Logistics Management Institute (commonly known as LMI), a think tank created by Pentagon procurement officials. These studies relied on unverified data provided voluntarily by defense contractors. The obvious fault of such studies is that when a contractor knows his figures will not be audited, he is apt to report profits lower than they actually are.

Because of deficiencies in the LMI profit studies, Congress directed the General Accounting Office to make an independent study of defense profits. The General Accounting Office report, however, suffered from similar deficiencies—its conclusions were also based on unaudited profit data.

The General Accounting Office profit report itself confirms that unaudited profit information volunteered by defense contractors is unreliable. A GAO random check on the data submitted by contractors revealed that actual profits averaged about 10 percent higher than reported on the questionnaires. In addition, in a separate part of its study, the General Accounting Office audited 146 specific contracts. This audit showed profits much higher than those reported by contractors. Here is the difference:

Pretax Profits	Unaudited Figures Supplied By Contractors	GAO Audit of 146 Contractors
As a percentage of costs	4.4%	6.9%
As a return on total capital	11.2%	28.3%
As a return on equity capital	21.1%	56.1%

Despite these findings, the General Accounting Office, at the insistence of the Defense Department, used the unaudited profit information as the basis for its main conclusion. After being groomed by defense industry groups and the Department of Defense, the General Accounting Office report was not much different from the LMI reports. This is what the Defense Department and its contractors wanted to hear.

If the Defense Department's profit reporting system and these profit studies were accurate, you might at least expect them to reach consistent conclusions. In fact, there are large differences between profit figures that turn up in the profit studies and those in the Defense Department profit reporting system. For example, the LMI profit reports and the General Accounting Office report show actual or "coming out" profits much lower than negotiated, "going in" profits. The Department of Defense profit reporting system, however, shows that "coming out" profits coincide closely with "going in" profits for cost reimbursement, redeterminable, and incentive contracts.

Another unexplained difference is that profits reported on a contract-by-contract basis in the Department of Defense profit reporting system are substantially higher than the profit figures reported to the General Accounting Office. The Defense Department figures show average profit on costs of about 8 percent—almost twice as high as those reflected in the General Accounting Office report.

Both the LMI and the General Accounting Office profit studies took considerable time and effort. This type of study would be unnecessary if the Department of Defense had a reliable profit reporting system. Defense contractors know how much profit they are making; the government should know as well. The taxpayer ought to be spared these needless studies.

Return on Investment

The General Accounting Office profit study stresses the importance of relating profits to a contractor's investment, rather than to his costs, as is currently the practice in the Department of Defense. I agree. I have been emphasizing this point in testimony for years.

The Defense Department's current profit policies reward inefficiency. Under today's defense procurement regulations, the higher the costs on a defense contract, the higher the profit. Contractors have no incentive to invest in new machine tools or other facilities which could make defense work more efficient. There is instead a strong incentive for a contractor to maintain minimum investment with the highest possible cost base for determining profit.

Last year I reported to my superiors a specific example of the inequities of the present practice of figuring profits as a percentage of costs. Two contractors were each awarded noncompetitive contracts for the same kind of job. Contractor A's costs were $26 million—45 percent higher than Contractor B's for a comparable scope of work. Yet Contractor A was paid $1. 4 million more profit than Contractor B. The contractor with the higher costs was awarded a higher profit than the more efficient contractor.

In my judgment, the most valuable aspect of the General Accounting Office study is the clear statement that the Department of Defense must begin to take the contractor's investment into account in settling profits on defense work. Until defense profit policies are changed, situations like the one I just described will crop up again and again. Congress will have to watch this closely. The Department of Defense, if it does change its procedures to consider return on investment, will probably come up with a formula to guarantee defense contractors even higher profits, so that the defense industry will accept the change.

Uniform Cost Accounting Standards

To measure profits accurately, it is necessary first to measure costs accurately—to measure costs in accordance with consistent and uniform standards. Until last year defense regulations provided only a "guide" for determining costs on most defense contracts. However, in its recent study of the feasibility of establishing uniform cost accounting standards for defense contracts, the General Accounting Office confirmed my testimony of many years that even these guides were not adequate for the purpose of determining costs on defense contracts. As a result it is virtually impossible to determine actual costs and profits on most defense contracts.

To give you an example, here is an accounting trick I learned of only the other day. One of my suppliers has two methods of calculating a cost of sales figure. In pricing new business, he uses what I will call Method A. Method A gives a low cost of sales figure which results in a high plantwide general and administrative expense rate. Using this method he calculates an $8 million cost of sales figure for work performed to date under one contract. He uses Method B, however, in billing the government for progress payments under this same contract because he gets more progress payments by showing higher costs. Method B yields a cost of sales figure of about $16 million—$8 million more than Method A. Thus, his cost of sales for this particular contract is either $16 million or $8 million depending on whether he decides to use Method A or Method B. Either method is acceptable under today's defense procurement rules.

Last year, as a first step toward greater uniformity in accounting, the Defense Department accepted and implemented my recommendation to make its accounting guides mandatory for all defense contracts. And an important step toward providing a sound basis for defense procurement was made with the passage of the Uniform Cost Accounting Standards legislation last summer. Even so, it will be some time before we have an adequate basis for determining costs and profits on defense contracts.

To me the establishment of proper accounting standards is fundamental to the improvement of defense contracting. Consistent and uniform standards are essential to measuring efficiency, evaluating the reasonableness of prices, and calculating profits. However, even this fundamental step faces a difficult future. First, uniform cost accounting legislation was passed over the vigorous objections of the defense industry lobby, and with only lukewarm support from the Department of Defense, which had for years opposed it.

Industry has representation of the Cost Accounting Standards Board itself. The Comptroller General appointed as the industry representative a critic of uniform cost accounting standards. This industry representative has made it clear that he will try to get more liberal accounting rules for industry.

Now that legislation has been enacted, the defense industry's lobbying tactic, of course, will be to embrace the concept and attempt to steer the standard to industry's advantage. Already defense contractors are bringing their great influence to bear. The press recently reported a reception given by the National Security Industrial Association for the Comptroller General and his deputy for the purpose of getting better acquainted, now that the Comptroller General is heading the Cost Accounting Standards Board. In January, 1971, the Council of Defense Space Industry Associations formally extended to the Cost Accounting Standards Board its offer of "assistance" and "suggested guidelines for the modus operandi" of the Board.

Considering the great pressure defense contractors are bringing to bear on the Uniform Cost Accounting Standards Board, it will be difficult for it to arrive at fair standards. Congress itself will have to keep close watch over the activities of the Board to see that it does the job it was created to do; that its work is not undermined by the pervasive lobbying of defense industry pressure groups.

The Renegotiation Act

Congress enacted the Renegotiation Act in 1951 to check against excessive profits. However, in my opinion, the Act is largely ineffective.

In 1951, the renegotiation process was considerably stronger than it is today. Congress itself has weakened the process by adding exemptions and loopholes to the Act every year or two when the Act comes up for renewal.

In September 1969, I testified before the House Government Operations Committee on deficiencies in the Renegotiation Board process. I pointed out that we have the semblance, not the substance, of effective renegotiation.

The Renegotiation Board generally recovers excess profits and voluntary refunds in excess of the Board's annual operating cost. However, it provides no real assurance that defense contractors are being limited to reasonable profits.

Industry encourages the notion that renegotiation is an effective insurance against excessive profits. It attacks the Renegotiation Act at every opportunity. It presses for additional loopholes and exemptions in the Renegotiation Act. It lobbies to abolish the Board, claiming that the Truth-in-Negotiations Act and proposed improvements in Department of Defense procurement practices obviate the need for renegotiation. Nothing could be further from the truth.

What I see and hear about the Renegotiation Board is inconsistent with what I know about contractors and government procurements. I believe that the public is being misled. I believe that industry is making far more than it should on defense contracts and that, if the truth were known, defense contractors are actually happy to have the Renegotiation Board. In its current weak state, the Renegotiation Board poses no serious threats to their profits and, the process of successfully clearing the Renegotiation Board tends to sanctify defense profits in the eyes of the uninformed.

The fact is that renegotiation as it is carried out does not adequately protect the public. It is out of date with the current situation in defense contracting.

Take just one example—the growth of large industrial concerns and so-called conglomerates. In 1951, when the Renegotiation Act was passed, most of the Navy's major private shipbuilders were independent companies. They had their own corporate managements which were devoted chiefly to shipbuilding. Since 1951, most of these shipbuilders have been taken over by giant industrial concerns. Therefore, the Renegotiation Board no longer sees shipbuilding profits because they are averaged with profits on missiles or electronics or with any other defense activities of the parent corporation. In this way, large corporations can protect excessive profits on one line of defense work by averaging them with moderate profits on other defense work. This arrangement gives the conglomerates a substantial edge over smaller firms and offers the public no real protection.

Neither the Renegotiation Board nor anyone else in the government is keeping track of profits on shipbuilding contracts. I asked government officials involved with the Navy's shipbuilding program to tell me how much profit shipbuilders were making on Navy contracts. They did not know. The Navy had no overall record of what profits were being made on shipbuilding contracts. As a result of my question, the Navy asked the Defense Contract Audit Agency what profits were being made on shipbuilding contracts. The Defense auditors didn't know either but they said they would find out. Later they said the shipbuilders would not release the data.

Since these shipbuilders do almost all their work for the government, it seemed to me that the government has a right to know what profits are being made on Navy contracts. Therefore, I made an issue of this matter. Now I understand that two large shipbuilders have agreed to give their profit data to the Navy.

Let me give you an example to show you why I am concerned about shipbuilders' profits. One typical shipbuilder I deal with had about $230 million in Navy business last year—more than 95 percent of his total sales. Nearly all of his defense contracts are either cost type contracts or incentive type contracts under which the government bears the major risk of cost overruns, thus assuring the shipbuilder's profit. The negotiated profit rates on his contracts vary, but average over 10 percent. If he actually earned 10 percent on his Navy work—and I believe he made at least that much—then he would have made $23 million in profit on his Navy contracts.

This shipbuilder has nongovernment-owned assets of about $60 million. Thus, his return on investment ($23 million profit on assets totaling about $60 million) was about 38 percent last year. This is over twice the average return on investment indicated in Fortune's 1970 survey of the 500 largest industrial concerns. And it is several times higher than the four or five percent you or I can earn on our investment in a bank deposit.

Truth-in-Negotiations Act

The Truth-in-Negotiations Act was enacted in 1962 to put the government on an equal footing with industry in negotiating costs and profits on defense contracts. However, it has been neither effectively implemented nor properly enforced by the Department of Defense.

A large number of defense contractors, including many of the nation's largest companies, regularly refuse to provide the cost and pricing data required by the Truth-in-Negotiations Act. In some cases, entire industries have decided not to comply with the law.

The Atomic Energy Commission and the General Services Administration report that the computer industry as a whole refuses to provide the cost and pricing data required by the law, even though the government buys about $3 billion worth of computer equipment each year. I am told the same is true in the tire, ball bearing and communications industries.

I am plagued by this problem in my own work. For example, large steel companies producing HY-80 and HY-100 steel for Navy ships have for years refused to obey the law requiring them to furnish cost and pricing data. These specialty steels were developed at government expense and are used almost exclusively on defense production. Only a few firms make these steels. The two principal suppliers so set their prices that when transportation costs are added to their quoted prices, the total cost to the consumer is the same. The General Accounting Office looked into this situation six years ago: it found that the companies were making high profits on the specialty steels, and that there was no real competition for these products. This is exactly the kind of situation where the government needs the protection of the Truth-in-Negotiation Act. But the steel companies adamantly refuse to comply, and no one has been able to obtain cost and pricing data on these steel procurements.

In nickel procurement, where one supplier has a virtual monopoly, the same situation applies. The company refuses to provide cost and pricing data.

The forging industry is another example. Even though in many cases the government has supplied production facilities to facilitate the contractors' performance of defense contracts, these suppliers defy the Truth-in-Negotiations Act and refuse to provide cost and pricing data for the forgings they supply.

The Truth-in-Negotiations Act also requires a prime contractor to obtain cost and pricing data on subcontracts above $100, 000. Instead of following this requirement, contractors—often with the assistance of government contracting officials—have devised various means to avoid obeying the law. One shipbuilder purchased $3. 4 million of steel on a sole-source basis for a Navy ship. To circumvent the requirements of the Truth-in-Negotiations Act, he actually issued 1200 separate purchase orders, so that no single order was above the $100, 000 threshold.

Other prime contractors resort to similar devious devices to avoid compliance with the law. The Act exempts competitive procurements from the requirement for cost and pricing data. I have seen procurements labeled "competitive" where only one company bid. They were deemed "competitive" simply because other suppliers were asked to bid. In order to evade the Act, one procurement was called "competitive" where the only other bid was 250 percent above the low bid. Just recently I reported to my superiors that a large shipbuilder claims he is buying nickel alloys on a "competitive" basis—without obtaining cost and pricing data and even though only one company produces the alloys.

Contractors also take advantage of the provision of the Act which exempts procurements of "standard commercial items" sold to the general public. You would be surprised at some of the military items that suddenly become "standard commercial items" when it is necessary to get around the Truth-in-Negotiations Act.

This disregard for the law exists because the Defense Department does not enforce the Act. The Department of Defense has been unwilling to require compliance from large defense contractors. Computer manufacturers, steel manufacturers, nickel producers, forging suppliers, divisions of some of the nation's largest defense contractors—whole segments of defense industry—refuse to comply with the Truth-in-Negotiations Act. This situation is well recognized at the operating level; yet senior Department of Defense procurement officials act as if it did not exist.

In a letter dated April 21, 1970 to the Chairman of this Committee, the Defense Department stated that, generally speaking, defense contractors have provided cost or pricing data when required by law except in a few selected cases; that, with the exception of two firms, the Department of Defense does not know of any industries or companies that refuse across-the-board to provide cost and pricing data; and that since the passage of the law the Department of Defense has granted only a minuscule number of waivers. At the time that letter was written, the problems in obtaining compliance with the Truth-in-Negotiations Act had been well documented in Congressional testimony. In addition, within the six months preceding the Defense Department's letter, I had referred several specific instances of noncompliance to my superiors and requested their assistance in obtaining cost and pricing data. In at least two cases the Navy had requested the Department of Defense to assist in negotiations with forging suppliers who refused to comply with the law.

It is incomprehensible to me that defense procurement officials do not know of any companies that refuse to comply. Many defense contractors are quite open about it. Here is a sample of the responses:

—"Pursuant to your request for cost information covering the manufacture of stainless steel rod containing isotopic boron ten, I hope you appreciate our policy of retaining our cost information for our own use. This is a consistent practice which we have following throughout our history."

—"This is to confirm our conversation that our policy does not provide for submittal of (cost data) form nor will we allow an audit by government contracting officer."

—"Upon your request we have given every consideration to supplying either you or the U. S. Navy a completed (cost data) form. In view of the obvious importance of what position we take on this matter, our uppermost management was consulted. Their decision was we will not submit subject form under any circumstances."

—"Please be advised that (we) will not submit cost and pricing data on the inquiry referred to above. Further, in the event (we are) tendered a purchase order pursuant to the subject inquiry, we would not accept such a purchase order if such acceptance was conditioned on our submission of cost and pricing data."

—"We must respectfully decline to furnish cost and pricing data to either (the prime contractor) or the government."

Nor has the General Accounting Office been of much assistance in resolving these problems. Late last year the General Accounting Office issued a report on the Truth-in-Negotiations Act. In researching for the report, the General Accounting Office found overcharging on more than half the procurements reviewed. Its recommendations, however, dealt only with minor issues. The report did not mention the problem of industry noncompliance with the Act.

In summary, the Truth-in-Negotiations Act has not been effectively implemented or enforced by the Department of Defense. As a result many large defense contractors—whole segments of defense industry—do not comply with the Act. To obtain compliance the Department of Defense will have to use the leverage of its purchasing power. Contractors that refuse to comply with the Truth-in-Negotiations Act should be ineligible for contract awards just as they are when they do not comply with other federal laws such as the Davis-Bacon Act, or the Equal Employment Opportunity Act. In parallel, the Department of Defense should be required to tighten up its procedures for monitoring compliance with the Truth-in-Negotiations Act.

Claims Against the Government

Many defense contractors argue that they should be getting higher profits because of the high risk in performing defense contracts. Theoretically when a defense contractor takes a firm fixed price contract, he assumes a risk that he will make or lose money on the contract. In practice, however, this is rarely the case. Most defense contractors eliminate this risk by the technique of making claims against the government.

There has been a sharp increase in the frequency and amount of contractor claims during the past few years—particularly shipbuilder claims. Today claims are a way of life. A contractor can turn almost any contract into a cost-plus transaction simply by submitting claims for changes or for extra work he allegedly performed beyond the requirements of the contract. In this way, the price of the work and the contractor's profit can be adjusted upward, even on a so-called "fixed-price" contract. Contractors retain claims lawyers and they train personnel at all levels in how to recognize and report situations that could possibly be used as a basis for claims. Some contractors have set up special claims and change groups to handle their claims. They start preparing claims the day they get a contract.

The actual costs of performing the extra work claimed are seldom supported by the contractors' accounting records. Instead, the contractor will prepare an inflated estimate which gives him room to negotiate an overall settlement that is satisfactory from the contractor's standpoint. The contractor submits his claim--usually with voluminous paper work prepared by his legal staff—then starts clamoring for a settlement. Since many claims involve matters that occurred months and years before the claims were submitted, government officials often settle these claims with little firsthand knowledge of the facts.

Part of the increase in claims activity over the past few years may be due to Washington claims lawyers. These law firms probably get a fee based on how much they can get from the government. One prominent Washington attorney, who served most of the 1950's as General Counsel to one of the military departments, today handles claims against the government for several large defense contractors. Another leader in the claims business was formerly the Chairman of the Armed Services Board of Contract Appeals. After occupying key jobs in the Defense Department, these men are well prepared to prosecute claims against the government—working across the table from their former colleagues and employees.

Almost any defense contractor is able to evade his contract if he so chooses. For some contractors it may be more profitable to pursue claims against the government than to perform the contract. It is like some mail-order houses; they make more money from the interest on charge accounts than on their sales.

The Navy's method of settling claims may be contributing to the increased number of claims. The Navy tends to settle its claims by bargaining. In one case, the Navy settled a multi-million dollar claim at nearly the full amount claimed by the contractor without even completing a legal analysis of the case. The Navy Counsel wasn't even consulted on the amount of the final settlement arranged by the contracting officer.

My opinion is that the Navy should not be making payments for claims unless these payments are based on strict legal entitlement and a factual determination of amounts due. Any claim, or any item in a claim, that is not solidly grounded in fact or in law should be eliminated from claims settlements. If a shipbuilder considers he is entitled to payment for any item not clearly covered by contract, or not susceptible to factual determination, those items should be resolved by the courts and not by the Navy. As a check on the Defense Department, the General Accounting Office should review contractor claims to make sure they are being resolved on their merits.

Government-Owned Equipment in Defense Contractors' Plants

To the extent defense contractors can get and keep government-owned tools to perform government and commercial work, they are able to expand their capacity and profit base without increasing their capital outlay. This enhances their total profits and their return on investment.

In prior testimony, I have pointed out some problems in the administration of government-owned tools in contractor plants. I pointed out that the Department of Defense was routinely authorizing use of government machine tools, even after the work for which the tools were originally provided had been completed. As a result the government is incurring considerable additional costs because the machine tools were not available for other bona fide defense needs. I said that suppliers accustomed to using government-owned machine tools had no incentive to invest in machine tools. In addition, suppliers holding government-owned machine tools have a decisive competitive advantage over suppliers without government tools because these tools can also be used in the performance of commercial work. The token rental rates charged by the government for such commercial uses are quite inadequate to offset the competitive advantage.

Senator Proxmire has introduced the Fair Industrial Competition Bill to tighten up the administration of government-owned tools in the hands of defense contractors. The proposed bill will aid in discouraging further abuses. The Joint Economic Committee, by spotlighting of these problems in prior years, has already made some progress in getting the Department of Defense to improve its regulations and its handling of government-owned tools.

Department of Defense profit policies are a major contributing factor in this problem. As long as the Department of Defense relates profit only to cost, suppliers will have no incentive to provide facilities for government work. This is another reason why you should try to get the Department of Defense to face up to the need for consideration of supplier investment in its profit policies.

Recommendations

I have previously provided detailed recommendations which, if implemented, would go a long way toward correcting some of the procurement deficiencies I have mentioned today. In short, I have recommended the following:

1. Defense procurement regulations must be revised so that return on investment is considered in establishing profit rates on defense contracts.

2. Contractors should be required to report costs and profits on any defense order over $100,000. The Department of Defense should periodically summarize these reports for Congress.

3. The development and implementation of uniform cost accounting standards must be expedited.

4. The Truth-in-Negotiations Act must be strengthened and enforced.

5. The Renegotiation Act must be strengthened and made permanent.

6. The General Accounting Office should make a review of contractor claims to ensure that claims are being settled on their merits.

7. Congress should maintain close surveillance over government-owned facilities in contractor plants and related methods of financing production equipment. Finally, revising defense profit policy to consider return on investment would materially cut down contractors' reliance on government-owned facilities.

Conclusions

None of the problems I have described here today are new. I have frequently raised them with my superiors in the Defense Department. I have also testified about them to various committees of Congress.

The Department of Defense has done little to correct these deficiencies, nor will it do so in the future unless it is prodded by Congress. What progress has been made to date has been prompted by Congress.

Dr. Robert Anthony, the former Comptroller for the Department of Defense, sized up the situation correctly in testimony before the House Banking and Currency

Committee last year. Discussing the inadequacies of the accounting rules in the Armed Service Procurement Regulations, he said:

> "The facts are that despite the glaring inadequacies that have been pointed out repeatedly over a period of years, few changes have been made. I see no likelihood that significant improvements will be made so long as the responsibility remains in the Pentagon."

I agree with Mr. Anthony and that is why Congress must take the initiative.

Through the influence of former defense industry personnel in key government positions, and through the social and business dealings with defense contractors, the Defense Department has adopted a business philosophy that too often puts defense contractors' interests above the public interest. It is no longer necessary for defense contractors to perform efficiently in order to earn a profit. The defense industry has convinced the Department of Defense that we have no right to know how defense contractors spend public funds or how much profit they make on military hardware. The Defense Department accepts loose accounting rules that make it impossible to determine costs and profits with reasonable accuracy.

Today, the scales of justice are weighted toward defense contractors—and "Justice" herself wears no blindfold. It is this sort of favoritism that leads to disrespect for the law. Is not the equity of 73 million U.S. taxpayers—your constituents—to be considered as valid as that of the small number of defense contractor and subcontractors?

If there is ever to be a noticeable improvement in defense procurement practices, Congress will have to take a more active interest in defense procurement than it has in the past. Little or nothing will be done unless Congress does it.

A century or so ago, Disraeli said of England that "the Privileged and the People formed Two Nations." It was a dichotomy few Americans at that time would have applied to our own country. For we were a democracy and England was not—though she has long since become one.

I am not at all certain that we can today assert with confidence that we are one Nation, not two; that our laws apply with equal force to every American; that there are no privileged segments set off from the people at large; that there is not a Nation composed of large corporations and another composed of the people—a Corporate America and an America of individual citizens.

Certainly there are "the Privileged and the People" where taxation is concerned. There are two sets of rules, one for the privileged segment for whom loopholes have been written into our tax laws, the other for the rest of the people who are paying taxes on all of their income. There is indeed a dichotomy and it is much on people's minds. For it is contrary to every principle on which this Nation was founded.

Surely, equality before the law was the first of these principles alongside the accountability of the government to the people. Privileged status reflects superior power wielded by one segment of the population over the rest. If any one thing is more destructive of democracy than anything else, I believe it is power not based on the will of the people, and privilege bestowed by government on those who wield such power.

OPENING REMARKS
OF
ADMIRAL H. G. RICKOVER
BEFORE
SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT
JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES
JUNE 7, 1976

Mr. Chairman, I was invited to testify today about procurement and related problems. Your staff, however, has asked me to focus on the shipbuilding claims problem, and particularly on the claims submitted by Newport News.

I have testified previously to this committee and to other committees of Congress regarding the shipbuilding claims problem. The current claims problem permeates nearly all aspects of my work. The Navy must rely on contracts in obtaining the ships, weapons, and the supplies it needs from industry. Contracts set forth the rules under which the work is to be done. The responsibility of Government officials involved in the administration of the work is two-fold: first, to ensure that the work is performed properly in accordance with the contract terms; second, to ensure that public funds are legally spent.

Government contracts provide a mechanism to resolve contract disputes.

When the parties are unable to resolve their differences through negotiation, the contractor can request a formal ruling by the Contracting Officer and, if he disagrees with the Contracting Officer's decision, he may appeal it to the Armed Services Board of Contract Appeals. There, the contractor can have his case heard by an independent forum. If he disagrees with the decision of the Armed Services Board of Contract Appeals, he can appeal to the Court of Claims.

In the area of shipbuilding claims, the Defense Department has decided to short-cut this process in an effort to resolve quickly the current Navy shipbuilding claims. The Defense Department has notified Congress of its intent to settle claims with four shipbuilding companies by use of Public Law 85-804. This statute gives the Executive Branch authority to provide extracontractual relief whenever such action is deemed necessary to facilitate the national defense. Authority to provide such relief has been vested in senior officials of the Defense Department, but subject to Congressional review.

For the past several weeks the Defense Department has been negotiating with the four shipbuilders in an effort to reach a settlement it can present to Congress. The Defense Department has stated that it will report the results to the Armed Services Committees on June 10th. I am not involved in these negotiations.

For years, the Navy has been under considerable pressure from some shipbuilders to settle claims on a lump sum or total cost basis which would make potentially unprofitable contracts profitable. These shipbuilders assemble large teams, comprised of lawyers, contract specialists, and accountants, to draw up their claims. One shipyard used as many as 100 people to prepare a single claim.

To generate the basis for large omnibus claims, employees are encouraged to search out and report actions and events that may be used as the basis for a claim against the Navy. Even minor technical matters are now treated as contract matters.

As a result, settlement of contract changes has become increasingly difficult. Often the company either refuses to price the changes in advance, quotes excessive and unsupported prices, or demands the right to reopen contract pricing later for other reasons such as cumulative or ripple effect of changes. Because of the length of time for ship construction and continued need to update ship specifications to meet new defense needs, changes are and always will be an inherent part of ship construction. Shipbuilders, from many years of experience, are well aware of this when they take Navy shipbuilding contracts. Historically, the changes amount to about 5% of the contract work. The Navy, of course, is contractually obligated to equitably adjust contract price and delivery date to reflect the impact of changes. Whenever possible, the Navy tries to reach agreement with the shipbuilder on price and schedule adjustment prior to authorizing the change. However, shipbuilder actions often make this impossible.

Along with the valid changes shipbuilder include in their claims, they include many allegations against Government administration of contracts. It is frequently difficult to sort out their various accusations, let alone determine legal entitlement or assess cost impact. Their claims are based on the evidence of contractors; not from that of those paying the bills.

Shipbuilders have complained of untimely delivery of Government furnished equipment and drawings; defective specifications; excessive tests, trials, and inspections; constructive changes to work scope and letters of direction; Government insistance on erroneous contract interpretations; Government recruiting practices, Government interference with contract performance through imposed limitations on work methods, and other shipbuilding operations; changes in health and safety laws and pollution control laws; Government "abuse of discretion"; Government imposition of management systems; and the Government's unilateral revision of contract requirements.

Sometimes, the same complaint reappears under various descriptions, leaving the impression of widespread Government interference. Other elements of the claim are based on alleged "facts" which contradict one another. Claimed costs seem to increase exponentially, as a function of so-called cumulative or ripple effect. And all cost increases are compounded, it is claimed, by inflation.

Some shipbuilders defer the negotiating of certain changes for years, when they know what their final costs will be. These changes are then consolidated into a general allegation of Government responsibility for all delays and costs experienced, without relating the individual causes to specific effects. The amount then claimed has often been inflated sufficiently to produce the profit desired by the shipbuilder, even though the claim is finally settled for but a portion of the claimed amount.

Some shipbuilders' claims contend that all delays and increased costs are the Government's fault, even when the shipbuilder must know that much of the delay and increased costs were caused by factors within his contractual responsibility.

In this connection, it is important to note that Newport News, whose claims comprise the largest portion of outstanding shipbuilders' claims, still refuses to certify that its claims are current, accurate and complete. The Navy is required by Navy Procurement Directives to obtain such certification before devoting its energy to evaluating the claim. I believe the company's claims are substantially overstated.

The fact that shipbuilders have been willing to settle their claims for far less than the amount claimed should cause one to question the validity of the amounts our taxpayers are being asked to pay. This may also explain the reluctance of some company officials to certify the claims.

The Navy's normal claims evaluation procedure is to determine and pay only for items of Government responsibility. This requires the Navy to perform a rigorous analysis to determine the legal basis for payment. Theoretically, the burden of proof rests on the contractor to demonstrate legal entitlement. In practice, the Navy itself, to demonstrate that the contractor is not entitled to the larger amounts claimed, often ends up having to construct whatever legitimate case the shipbuilder might have. The Navy analysis is time consuming and uses the time of many technical people, to the neglect of their proper work.

Even when Government officials have spent months analyzing voluminous shipbuilders' claims, and successfully demonstrated the elements of a claim which are not valid, the contractor may then withdraw the claim, only to resubmit it based on a new rationale to support his contention that the Government owes him money. The result is to cripple Navy efforts to evaluate claims and to prolong settlement.

Knowing this, some contractors try to force a settlement by threatening to stop work if claims are not paid quickly. Armed with voluminous, generally unsupported claims, some shipbuilders and their lobbyists at times take their case directly to Congress, to senior defense officials, and to the press. They accuse working level Navy personnel of wrongfully withholding funds and delaying settlements, of creating a litigious atmosphere, and of undermining good business relations. They allege that the company is in desperate financial straits. They threaten that, unless immediate relief is forthcoming, the Navy will not get its ships, and so on. By these means some shipbuilders believe they will be paid more than if their claims were settled on their legal merits.

A specific example will illustrate this. About two years ago, Newport News officials and their superiors at Tenneco began airing complaints concerning the Navy before Congress and in the press. Company officials took the position that on all Navy shipbuilding contracts they should be guaranteed a 7 percent profit after paying interest and other unallowable costs.

Despite Newport News' notification as early as October 1974 of its intention to submit claims, the company did not submit these until recently—$825 million of the $894 million total in the last year, of which $665 million was submitted in the last six months. But once these claims were submitted, the pressure to settle them began immediately. On February 19, 1976, Newport News submitted its largest claim on a single contract; a $221 million, sixteen volume claim against the carriers Nimitz and Eisenhower. The very next day the President of Newport News wrote to the Chief of Naval Operations intimating that Newport News was considering stopping work on the aircraft carrier Vinson, and not entering into new Navy shipbuilding contracts until its claims were resolved.

Six months earlier, Newport News had actually stopped work on a nuclear-powered cruiser, the CGN 41, claiming that the contract option for construction of that ship was invalid. Construction was resumed under court order. However, Newport News still refuses to recognize the validity of the option because they want a higher price than they had previously agreed to contractually. Although the Navy lawyers are convinced that Newport News has no valid legal basis for its contentions, it could take years of litigation to establish that point. When Newport News appealed this matter to the GAO, the GAO decided in the Navy's favor. Newport News is now contesting the GAO decision in the federal court.

In this regard, it should be noted that the Navy is at a disadvantage in litigation of claims due to the imbalance in legal resources between the Government and contractors submitting claims. In the case of the cruiser dispute, the brunt of the Navy's legal work is being handled by one lawyer, two years out of law school, as one of several assignments. I am not questioning this individual's competence. I simply want to point out the disparity between the counsel representing the Government and the counsel representing Newport News. To date, Newport News charged the Navy over $175 thousand for outside counsel fees pertaining to the CGN 41 dispute plus a seven percent profit for Newport News itself. It is interesting to me that for several years I have been unable to get the Navy to hire outside counsel to help the Navy prepare its case, yet the Navy is paying Newport News for its outside counsel to fight the Navy, as well as a seven percent profit for doing so.

Newport News officials have made their intentions clear. On March 15, 1976, the President of Newport News sent a publicly released letter to one Congressman in which he stated: "I need to bring all the pressure to bear that I can for a prompt and equitable resolution of the differences between the Company and the Navy. Time has run out." Newport News has brought pressure to bear on the Navy through other public statements; by complaints to defense officials and to Members of Congress; by threats of not taking future Navy business; and by actually stopping work on the CGN 41.

There seems to be a tendency in some quarters to view the shipbuilding claims problem as simply one of human relations. In fact some claimants would have you believe that the whole problem has been created by personalities. They have made shipbuilding claims a political and personal matter. In actuality it is one of money. If a shipbuilder intends to hold out for more than he is legally owed, his relations with the Navy will deteriorate until either he convinces the Navy to pay whatever he wants regardless of legal entitlement; or, until the Navy convinces him he will get only what he is legally owed, regardless of pressures the company may bring to bear. From the Government standpoint, I view the issue this way: Why bother negotiating and signing contracts if they are not going to be enforced?

To maintain a sound basis for conducting future business, I believe the Navy should insist on compliance with its contracts—in federal court if necessary. If contractors believe they can evade their contractual obligations by submitting inflated claims; refusing to honor contracts; complaining to higher authority, and the like; then all defense contractors will be encouraged to follow this approach in the future.

Our purpose today is to see to it that the Government gets value for the money it spends. This is a practical problem agreed to by all men of good will.

I try to resist the giving away by the Navy of money that contractors are not legally entitled to. Of course, everyone who testifies is all for economy. But some who testify "for economy" do so for the same reason that fox-hunters join the SPCA.

Some people say I have no business to become involved in or to criticize the contracting or other methods of the Defense Department. They say, if any criticism is needed it should be left to those whose job this is. But some of these people have ceased to be capable of self-criticism. Although these officials have great power to protect the taxpayers, they sometimes appear impotent when called upon to do so. It is as if

Prometheus had become manager of only a match factory.

People who try to improve the situation run considerable risk. I am reminded of Admiral St. Vincent (Lord Jarvis) who quelled the mutiny in the Mediterranean Fleet and prepared the British Navy for its later victory by Admiral Nelson at Trafalgar. He became the First Lord of the Admiralty. However, he was removed from office for trying to abolish dockyard corruption.

Although financial dishonesty is a matter of great importance, the real evil that follows general commercial dishonesty is the intellectual dishonesty it generates.

Philosophically, I am also aware that there may be some wealthy corporate officials who, by their actions, appear firmly to believe in the hereafter; also that shrouds have pockets. The Recording Angel may occasionally shed a tear for a sinner but I doubt he will do so for these officials.

Mr. Chairman, this is a brief summary of what confronts us. I have not read the 64 volumes of claims submitted by Newport News. To my knowledge, neither has anyone else in the Defense Department. The claims have not gone through the normal audit, or technical and legal analysis. However, some general items of interest in the claims have been brought to my attention.

I will be glad to try to answer any questions you may have.

THIS STATEMENT REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

OPENING REMARKS
OF
ADMIRAL H.G. RICKOVER
BEFORE
SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT
JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES
DECEMBER 29, 1977

Mr. Chairman, you have requested that I testify about shipbuilding claims and possible violations of fraud or false claims statutes contained in claims against the Navy. The views I express are my own, and not necessarily those of the Navy.

The claims problem is not new. There were shipbuilding claims against the Navy even before the MONITOR and MERRIMACK. In fact, one ship of the MONITOR Class was the subject of a shipbuilding claim.

For many years there have been problems in the way shipbuilding claims have been handled. In 1958, for example, the General Accounting Office reported that claims submitted by shipbuilders were vague and lacked adequate documentation; that Navy claims evaluations were inconclusive; and that claims had been settled without sufficient data to demonstrate Government responsibility.

Until the late 1960's, these claims tended to be small as compared to the amounts of today. For the most part shipbuilders honored the terms of their contracts and confined their claims to legitimate items. During that period one of the largest claim settlements that I recall involved an $8 million Electric Boat claim for a one-year Government-responsible delay in construction of a submarine. The contractor confined his claim largely to Government-responsible actions, and the claim was settled for about $7 million. At the time, $7 million was a large claim settlement; but, by today's standards, a $7 million claim is very small.

It used to be that, if a shipbuilder lost money on a contract, company officials would accept that fact and try to do better the next time. However, the Navy's settlement of the huge Todd Shipbuilding claim in March 1969 introduced a new era in shipbuilding claims.

This claim settlement was the first involving large so-called omnibus shipbuilding claims. Such claims -- sometimes called "total cost" claims -- do not show a cause and effect relationship between alleged Government responsible actions and the amount claimed. In essence, a shipbuilder, when faced with a projected cost overrun, makes a large claim based on general allegations that the Government is at fault and therefore should reimburse the shipbuilder for all his costs plus his desired profit -- regardless of his own performance.

These large shipbuilding claims seem to be "built backwards." That is, the shipbuilder estimates how much he wants and then assigns people to make up a claim that will yield that amount. Here is an extract from a report of one shipbuilder's internal company meeting in which his people were instructed how to prepare a large shipbuilding claim:

> "Division Planning will provide an estimate of manhours to complete the contract. This estimate will be compared with the original of total manufacturing manhours to do the contract, and the difference will be justified in a saleable manner.
>
> * * *
>
> "Mr. (X) stated that (the company) would have to use that information and data which would sell. Any data which would not sell would have to be omitted."

If claims prepared in this manner are paid independent of their legal merits, the effect is to convert fixed-price contracts into cost-plus contracts.

I am not certain who invented the omnibus claim concept and peddled it as a way to get out of potentially unprofitable contracts. But the two Washington law firms I most readily identify with this method of doing business are headed by a former Navy General Counsel and a former Chairman of the Defense Department's Armed Services Board of Contract Appeals. I have contempt for federal employees who acquaint themselves with the inner workings of Government and its vulnerabilities, only to switch sides later and profit personally from their inside information.

The Todd claims exceeded $114 million and were settled for $96.5 million -- about 84 cents on the dollar. In an April 1971 report, the General Accounting Office was harshly critical of the Todd Settlement, stating:

> "In our opinion, the material submitted in the contractor's proposal did not adequately demonstrate that the amounts claimed were caused entirely by acts of the Government and not possibly caused by the contractor's inefficiencies and/or unrealistically low bid."
>
> ...
>
> "We believe that the Department of Defense should take the necessary steps to ensure that settlements of claims are supported by factual and reliable data relating the specific amount claimed to acts of the Government."
>
> ...
>
> "We believe that in the absence of such information, there is not sufficient assurance that the settlements made were fair and reasonable. The practices presently being followed in settling claims could lead to an erosion of the contractor's incentive to control costs with a corresponding decline in the effectiveness of firm-fixed-price contracting."

These latter remarks by the GAO were prophetic.

Heartened by the greatly inflated Todd settlement, many private shipbuilders and their claims lawyers seized upon vague, unsubstantiated claims as a means of getting well on unprofitable contracts. As a result, the Navy was inundated with omnibus shipbuilding claims. In 1968, outstanding claims totaled $66 million; in 1971 -- $605 million; in 1974 -- $1.3 billion; today -- $2.7 billion.

In their campaign to have their claims paid, shipbuilders place the blame entirely on the Government. They frequently attribute their problems to inflation, faulty defense procurement policies, improper administration of shipbuilding contracts by the Navy, and a host of other reasons, all of which they contend are beyond their control. Shipbuilder inefficiencies, mismanagement, low productivity, and other problems are rarely, if ever, acknowledged in the claims or in public pronouncements by company officials.

Most shipbuilders keep their claims vague and general. In that way they can keep increasing the amount of their claims -- as many of them have done -- if they encounter further cost overruns.

Some officials of shipbuilding companies would have senior Government officials believe that the Government has an obligation to make their companies profitable, regardless of performance. When Government officials fall for this line of reasoning and make claim settlements in excess of amounts legally owed, they only encourage inefficiency and mismanagement. They also undermine the integrity of Government contracts, making them useless as a vehicle for conducting future business.

The takeover of all our major shipyards by conglomerates has made the situation worse. Conglomerates are staffed with legal, financial, and contract experts who tend to view shipyard operations as a financial game. Cash flow, public relations, lobbying, and "creative accounting" are their specialty. Under the conglomerate philosophy, "Managers" are interchangeable and results are measured strictly in financial terms. This tends to divert management attention away from the details of building ships. In general, corporate officials are not interested in building ships; they are interested in financial figures.

Shipbuilders should make a fair profit if their performance warrants it. That is the basis on which fixed-price incentive-fee ship construction contracts are negotiated. But in my opinion it is wrong for corporate officials to use claims, public relations, and political clout to pass on to the Government the results of their own poor management.

I have testified repeatedly about deficiencies in nearly all aspects of shipyard operations: ineffective cost controls and cost reporting systems; costs not related to progress in a manner that identifies potential overruns in time to take corrective action; subcontract procurements not managed in a business-like manner; excessive sole source subcontract procurements; superficial negotiations of subcontracts; poor productivity, including widespread idleness and loafing; inadequate material controls; overtime not properly controlled; ineffective internal audit systems; and excessive overhead costs. In the current environment, however, it is apparently easier to let costs come out where they will and submit claims than it is to establish better controls over the work.

In recent years, both Newport News and Electric Boat have encountered serious productivity problems as they increased their work forces. Both yards have had trouble training and managing an expanding work force. Their productivity problems delayed ships and caused higher costs. But to read the claims submitted by them, one could only conclude that all delays and cost overruns were the Government's fault. This is what I resent -- the dishonesty of those who pursue the claims business for a profit, and the unfair burden these invalid claims place on the Government employees who must refute them, and on the taxpayer.

Some shipbuilders, egged on by corporate officials and high-priced claims lawyers, have become proficient in developing, assembling, and prosecuting claims and have the trained specialists to do so. Sometimes the impetus for a claim comes from firms that specialize in this work. In fact, a whole claims industry is sprouting. Here is a promotional letter one company I deal with received from one of these claims specialists:

> "Dear Sir:
>
> We are specialists in all phases of Government and commercial contracting. Our specialty is the ability to obtain additional funds from fixed price customers. This is done via the constructive change basis, which means that the entire transaction is evaluated from the date of the order or contract to the date of actual delivery. All the extras, such as extra work performance, or delays,

> or interruptions are transposed into dollars and thus presented to the customer for reimbursement.
>
> This essentially is collecting for delivering something beyond the bargain. The obvious changes are easy enough, but the subtle or hidden changes that are not apparent; either to buyer or seller are the ones that we can transpose into a dollar recovery.
>
> Our credentials are available for your review, and our references range from the smallest companies to those appearing on the Fortune 500. A meeting may be beneficial."

The above letter is from a small time operator. The Washington law firms that specialize in claims against the Government are more sophisticated in their marketing efforts. They make companies aware of their services through seminars and publications on Government contracts and claims. At billing rates of up to $100 or more an hour, claims lawyers will develop and promote legal theories to blame the Government for any cost overruns their client incurs, or to contest the validity of a contract.

Many practitioners of the claims trade seem to specialize in obfuscation and harassment. If fact or the law is not with them in a case, some claims lawyers will harass the Government with voluminous claims, unsupported allegations, Freedom of Information Act requests, interrogatories, depositions, and the like. By generating mountains of paper and broadening issues, they hope to bog down Government officials or courts to the point that their clients can negotiate settlements independent of the claim's legal merits.

The strength of the claims lawyers lies in their ability to delay and harass the Government. They well know that with the high rate of personnel turnover in Government, time works to their advantage. They also know that the Government cannot assign anywhere near equivalent resources to the case, and that eventually they can wear the Government down.

Lawyers are supposed to be officers of the court charged with responsibility of searching out the truth. My experience has been that most claims lawyers try to hide or distort the truth.

I now have first-hand experience on how a law firm handles contract disputes. Through the month of December, I have been subjected to a deposition conducted by a Washington law firm that Newport News has retained in connection with the lawsuit between the U.S. Government and Newport News regarding the nuclear cruiser CGN41. The Government contends that the Navy has a valid contract with Newport News for construction of the CGN41. The company, seeking to reprice the contract, has contended it is invalid. But the issue of whether or not there is a valid contract may never be heard in court because Newport News succeeded in getting the District Court to dismiss the case without ever addressing that issue.

The case is now before the Court of Appeals. Since the District Court decision may be reversed, Newport News obtained a District Court order requiring my deposition.

This deposition has been an eye-opener for me. Day after day, I face as many as eight experienced lawyers. Three of them take turns interrogating me and the others busily confer with each other and write and pass notes. For over 35 hours so far my inquisitors have barraged me with questions about dates, places, letters, conversations and events spanning a period of six years. They seem incredulous because I do not remember documents written years ago even though I have pointed out to them that I have probably read close to three-quarters of a million documents and signed 50,000 in this period.

Mr. Chairman, can you imagine anyone expecting you to recall the details of every document you have signed in the past six years; who told you each piece of information in it; exactly what you meant at the time; what you may have said to people about it; and so forth? If I were to remember such information I would have no room in my mind to handle today's problems and plan for the future. Besides, I learned long ago that a written record is much more reliable than memory.

I have no idea how much longer my inquisitors will prolong this deposition. But I think any objective observer reading the deposition record must conclude that there can be no legitimate purpose in dragging this deposition out. As far as I can see, very few of the questions I have been asked have any discernable relationship to whether or not there is a valid CGN41 contract. I can only presume that depositions of this sort are designed to consume time and discourage Government employees from ever standing up to a large contractor or from having the temerity to put the interests of the taxpayers above those of a large conglomerate.

The shipbuilding industry has a lobby group -- the Shipbuilders Council of America -- which provides a forum for arriving at industry-wide positions. The theme of the major shipbuilders is the same -- that shipbuilding claims must be the Navy's fault since major shipbuilders have been experiencing cost overruns. They blame Navy procurement policies and they blame Navy personnel for allegedly failing to promote "good relations" with the shipbuilder.

The ultimate leverage these companies have is their control over the facilities needed to build ships the Navy vitally needs. Because partially completed ships cannot be transferred from one shipyard to another, they are sometimes held hostage in contract disputes. Both Litton and Newport News have threatened work stoppages thus forcing the Navy into court in order to require them to continue work. But Federal judges are not able to hear complex shipbuilding contract disputes and render judgements in a short time. In the two cases mentioned, the Navy was ordered to continue to pay the contractor's incurred costs pending resolution of the dispute. This is what both shipbuilders wanted.

Within the Defense Department, contract disputes have been made more difficult by the involvement of senior officials in matters that their subordinates should be handling. Many large and politically influential defense contractors have ready access to Defense Department and Navy officials throughout the chain of command. They use these contacts to their advantage. I suspect that most contractor officials prefer to deal with senior Defense officials because they are not as familiar with contractual details as the working level officials and therefore tend to be more sympathetic to contractor complaints.

In the past there have been far too many private meetings between senior Government and contractor officials on matters involving claims or contract disputes. These meetings undermine the efforts of those responsible for handling contract matters -- particularly when they are not in attendance. At times, those responsible have not been informed of the results of the meeting, or even that they were held.

There has been a high turnover of senior Navy and Defense officials. Each new arrival, although not acquainted with details of the claims, wants to apply his own "magic formula" to resolve the problem. Most of these attempts have been futile. Some have actually exacerbated the problem. Here are some ways various officials have tried to deal with the shipbuilding claims problem during the past several years:

o In 1971, the then Commander, Naval Ship Systems Command, personally negotiated with officials of Lockheed Corporation and tentatively agreed to pay the company $62 million in settlement of shipbuilding claims totaling about $160 million. This was the infamous "Golden Handshake" made without the benefit of a legal, technical, and financial audit of the claim.

Based on a subsequent audit of the claim, the Navy's contracting officer determined that the Navy owed only about $7 million, not $62 million. Lockheed appealed to the Armed Services Board of Contract Appeals. The Board, without reviewing the merits of the Lockhead claims, ordered the Navy to pay the $62 million on the basis that Deputy Secretary of Defense Packard had made statements which led the company to believe it would be paid that amount.

- In October 1969, following the Todd settlement, the Navy established a Contract Claims Control and Surveillance Group, to assure that major claims submitted by Navy contractors would receive an adequate and complete technical, legal and financial review. This Group disapproved some major claims settlements and was subsequently disestablished.
- In 1972, responsibility for resolving claims was assigned to a General Board consisting of Navy Admirals and a Claims Board comprised of "procurement executives" of the Naval Systems Commands.

By 1975, the Navy reported that the claims backlog had been drastically reduced as a result of claim settlements and that the problem was well in hand. However, in order to make the claim statistics look better, some Navy officials had resorted to semantic games. They relabeled several large claims "Requests for Equitable Adjustment." When the dollar value of these so-called Requests for Equitable Adjustment was added to claims in-house and appeals before the Armed Services Board of Contract Appeals, the Navy's total claims backlog was actually $1.5 billion, not $300 million as the Navy was then reporting.

- In April 1976, former Deputy Secretary of Defense Clements announced he would try to dispose of the Navy's $1.3 billion backlog of shipbuilding claims by providing extra-contractual relief under Public Law 85-804. The plan was to involve Litton, Tenneco, General Dynamics, and National Steel. This effort was abandoned when neither Litton nor Newport News would accept the maximum figure Mr. Clements felt he could offer.
- In July 1976, following collapse of the Public Law 85-804 plan, Mr. Clements approved the establishment of an independent, three-man Navy Claims Settlement Board to evaluate shipbuilding claims and try to settle them on their merits. A directive was issued

to the effect that no one be permitted to interfere with or give unsolicited advice to the Board. Initially, the Board was assigned all Newport News' shipbuilding claims, which totaled $894 million. In March 1977, the Board was also assigned the Electric Boat SSN 688 Class claim for $544 million.

The Board has settled one of the Newport News' claims, the one against the contract for construction of the nuclear cruisers USS CALIFORNIA (CGN 36) and USS SOUTH CAROLINA (CGN 37). This $151 million claim was settled for $44.3 million -- less than one-third the amount claimed. The Board is still negotiating with Newport News to resolve the remaining Newport News claims.

On 1 December 1977, just as the Navy Claims Settlement Board was about to complete its evaluation of the Electric Boat claim, the Chief of Naval Material directed that the Board terminate its efforts on that claim, and furnish the data they had thus far developed to a Special Steering Group under the Assistant Secretary of the Navy.

Grossly inflated claims are becoming accepted as standard operating procedure. Unless something is done to enforce the various Federal Statutes regarding fraud and false claims, we face the prospect of being harassed by such claims indefinitely.

The problem of inflated claims exists at all three private shipbuilders with whom I have dealt: Ingalls Shipbuilding Division of Litton Industries; Newport News Shipbuilding and Dry Dock Company, a subsidiary of Tenneco; and Electric Boat Division of General Dynamics Corporation. In prior hearings I have pointed out the problems I encountered in Ingalls' $40 million claim on their contract for construction of the SSN's 680, 682, and 683. Each time Government analysts refuted a portion of this claim, Litton revised the claim and resubmitted it.

Between November, 1970, and July, 1972, when a Contracting Officer's decision was issued, Litton had submitted five different versions of the claim -- but the amount of the claim always remained about the same. The claim was revised a sixth time in the appeal to the Armed Services Board of Contract Appeals (ASBCA) and a seventh during the Board's hearing. Each revision required extensive analysis and evaluation by Government personnel. After a four-month hearing on the matter and lengthy deliberation, the ASBCA -- obviously bogged down by the mass of data -- awarded Ingalls roughly half the amount claimed.

After reviewing the Litton submarine claim, I reported to my superiors apparent irregularities in the claim. I recommended that the claim be investigated for possible violation of false claims statutes. An 18-month independent review by the Navy came to a similar conclusion and the case was referred to the Department of Justice. A subsequent 2½-year investigation by the Justice Department resulted in Litton being indicted in Federal Court for violation of federal statutes prohibiting the submission of false claims. However, a Federal judge dismissed the indictment without hearing the case, citing an alleged procedural irregularity. The Justice Department has appealed the judge's decision.

In June, 1976, I testified at length before this committee about Newport News' claims. I cited many examples of grossly exaggerated and inflated items in the claim, including $97 million for "Parkinson's Law" and $32 million for "Navy Recruiting Practices." The record of the June, 1976, hearings explains these and other claim items in detail.

The one claim the Navy Claims Settlement Board has been able to settle shows that the Newport News' claims are greatly inflated. In February, 1977, the Navy Claims Settlement Board was able to settle the $151 million CGN 36 and 37 claim for $44.3 million -- only 29 percent of the total amount claimed. This settlement resulted in Newport News recovering all of its costs and a profit despite: (i) the very significant manpower problems Newport News experienced in building these ships; (ii) the 18-month delay in delivery of both ships from the original contract delivery dates during a period of double digit inflation; and (iii) all the difficulties encountered by Newport News during the construction of these ships regardless of cause or responsibility.

Newport News officials contend that it is wrong to characterize this settlement as "29 cents on the dollar." It is true that even if the claim had been determined to be completely valid and the contract ceiling price increased by $151 million, as the company requested in its claim, Newport News would not have actually recovered $151 million in cash. This is due to cost sharing provisions in the contract. However, the Navy had to review every element of the $151 million increase in ceiling price claimed in order to determine how much was valid and how much the company would be paid. Based on this review, the Board found that over 70 percent of the claim was invalid.

I have no way of knowing what proportion of the remaining $743 million of Newport News' claims are valid. The Navy Claims Settlement Board is still considering them. However, in accordance with Naval directives, I have submitted to appropriate Naval authorities four reports on Newport News' claim items under my technical cognizance which I believe warrant investigation for possible violation of fraud or false claims statutes. Since my review of claim items under my technical cognizance is incomplete, there may be more. Further, I understand that other people reviewing the claims have reported additional claim items for investigation.

A similiar situation exists with regard to the $544 million claim submitted by Electric Boat under two contracts for construction of 18 SSN 688 Class submarines. The claim was submitted on December 1, 1976. The General Manager of Electric Boat certified this claim as "current, complete and accurate."

He also certified the claim as accurately reflecting "the material damages or contract adjustments for which the Navy is allegedly liable."

The Electric Boat claim cites numerous Government actions which the company alleges caused all delays and increased costs experienced on the SSN 688 Class ships at Electric Boat. Yet, there were many contractor-responsible problems at Electric Boat which adversely affected production. These problems include a shortage of skilled manpower, poor productivity, start-up of new facilities, and a five-month labor strike.

Based on a review of claim elements under my technical cognizance, I have submitted to the appropriate Naval authorities a report on 18 Electric Boat claim elements which I believe should be investigated for possible violation of fraud or false claim statutes.

More than six months have elapsed since I submitted my first report regarding possible fraud in the Newport News' claims. As I understand it, two attorneys in the office of the Navy General Counsel have been given the task, along with their other duties, of reviewing these reports and of determining whether the claims should be forwarded to the Justice Department for formal investigation.

Senior Navy and Defense officials seem reluctant to investigate grossly inflated claims by shipbuilders, some of which involve hundreds of millions of dollars. This reluctance could stem from several reasons. Many of these officials came from industry or from law firms and may see nothing wrong with what these companies are doing to try to enhance their profits. Some may be reluctant to pursue the false claims issue, for fear of being criticized for not promoting "good relations" with contractors, or for scuttling a potential claims settlement, or for not seeing the "big picture." Moreover, corporations can bring great pressure to bear and cause delays so that it might take years to complete an investigation.

Large shipbuilding claims can be important to conglomerates as a means to defer or perhaps avoid having to report losses to their stockholders. The profit projections they use assume a given recovery under the claims. To the extent the figure assumed is greater than the amount the Navy determines it legally owes, the company has a strong incentive to avoid settlement through whatever means are available, including lengthy litigation, while it tries to pressure the Navy into a higher settlement offer.

Inflated claims also increase a shipbuilder's chances of getting paid more than he is contractually owed, or getting a lucrative settlement based on the Government's assessment of "litigative risk" and "litigative cost". "Litigative risk" is the amount Navy lawyers include in claims settlement offers to account for the possibility of losing in the Armed Services Board of Contract Appeals or in court.

"Litigative cost" is the amount the Government estimates it will spend to defend itself before the Board or in court. The larger and more complex a claim is, the more costly it is for the Government to litigate and the greater the risk that a shipbuilder, with his high-priced lawyers, can obfuscate the issues and win a favorable decision in litigation. Of course, "litigative risk" and "litigative cost" are highly subjective assessments which can be used to pay off claims while ostensibly settling them only on their so-called "legal" merits.

If Federal statutes covering fraud and false claims are not enforced, contractors will continue inflating their claims. Under these conditions the Government will continue to waste millions of dollars evaluating highly inflated claims which have little or no substance.

In my opinion, the Defense Department and the Justice Department should strictly enforce the False Claims Act and criminal statutes including those pertaining to fraud. Prior to settling a claim, the Contracting Officer should be required to certify that no evidence of fraud or false claims has been uncovered in his review. If such an affadavit cannot be made, all evidence discovered should be thoroughly investigated for possible fraud, with the assistance of the Justice Department.

I have testified previously and at length regarding the need for other improvements in the area of shipbuilding claims. These recommendations are as follows:

1. Authorize the Navy to hire outside counsel and such other assistance as is necessary to help with claims and claims-related matters. These lawyers should be authorized to perform any services in connection with these claims except representing the Government in court, which is properly the function of the Justice Department. We are not presently getting adequate legal support from the Office of Navy General Counsel.

2. Develop a permanent group of outside claims specialists including technical personnel, procurement experts, and attorneys to review and analyze major claims, do legal research, prepare legal documents, interview witnesses, and help prepare the

Government's defense under the direction of Government personnel. Presently, the burden of claims analysis is being borne by Government personnel to the detriment of their assigned responsibilities.

3. Require as a matter of law that prior to evaluation of any claim, the Government must obtain and the contractor must submit a signed certificate from a senior contractor official that the claim and its supporting data are current, complete, and accurate. There is presently a Navy requirement to this effect, but it is not always enforced.

4. Costs incurred by the Navy in evaluation of invalid portions of claims should be set off against the amount determined to be legitimately owed. This should discourage shipbuilders from using frivolous items in their claims.

5. Prohibit contractors from changing their claim after it has been finally submitted to the Contracting Officer. Following review by the Government, the contractors should be given an opportunity to furnish additional information needed to support the claim where the Government review indicates weakness. However, new theories of entitlement and new claims submissions should be barred. Often the Navy's claims analysis effort is frustrated by the constant revising of claims.

6. Require litigants and their attorneys to disclose at the outset of any commercial litigation all facts, whether favorable or unfavorable, relating to their lawsuit. In filing a case before the courts or administrative boards, the plaintiff and his attorneys should be required to sign a stringent certificate

that the information submitted in support thereof is current, complete, and accurate. Criminal penalties and disbarment proceedings should be invoked for false certifications. Under our present system, some shipbuilders contend that they are not required to disclose facts which would tend to undermine their claims.

7. Change the operation of the Armed Services Board of Contract Appeals as follows:

a. Give the Government the same right as contractors to appeal adverse decisions of the Armed Services Board of Contract Appeals. Presently, the Government has no recourse in the case of a bad Board decision or one in which the Board has exceeded its authority.

b. Until such right of appeal to the Courts is granted, the Department of Defense should provide for internal review of Armed Services Board of Contract Appeals decisions. Particular attention should be paid to questions of whether the Board is exceeding its authority.

c. Make any material obtained by contractors under the Freedom of Information Act, which is not obtainable by discovery proceedings, inadmissible against the Government before any Contract Board of Appeals or in any litigation. As it now stands, contractors can circumvent Board or Court restrictions on discovery by using the Freedom of Information Act. The Government has no such comparable rights.

d. Discontinue trials de novo before the Armed Services Board of Contract Appeals. Only evidence submitted to the

Contracting Officer should be allowed before the Armed Services Board of Contract Appeals. Today a shipbuilder can present the Board an entirely different case than he has presented to the Contracting Officer.

e. Promulgate a Board rule that law firms who violate the ABA Code of Professional Responsibility are not allowed to appear before the Board. Require that no one in the Defense Department shall do business with law firms which are in violation of the ABA Code of Professional Responsibility. At present there seems to be no effort by the Department of Defense to ensure that attorneys practicing before the Board comply with the ABA Code.

The above are my recommendations for improving the handling of contract claims. I recognize that some shipbuilders stand to lose considerable sums of money on their Navy shipbuilding contracts if their contracts are enforced. So be it. That is how free enterprise is supposed to work. Some of these losses result from mismanagement; some from unanticipated events which the contractor may not have foreseen, but which under the terms of the contract are not the legal liability of the United States Government. But, the point is that if shipbuilders are excused from their contracts, other Defense contractors will want similar treatment when they experience losses on their Government contracts. I view the problem this way: if contracts are not to be enforced, there is no sense negotiating them.

There has been a tendency for some of our transient Defense and Navy officials to believe the shipbuilding claims problem can be solved if only a way can be found to pay contractors their projected losses. These officials forget that if the Government had picked up the tab for such losses at any time in recent years, we would still have large claims today. For example, five years ago the Litton LHA claim was for about $270 million. By 1976, the claim had grown to over $500 million. Today, the Litton LHA claim totals over $1 billion.

The Electric Boat SSN 688 Class claim is another example. In early 1976, the Navy settled all outstanding claims on the first SSN 688 Class submarine contract through May 20, 1975, for $97 million. Then, General Dynamics officials offered the Navy a total claims release on both the first and second SSN 688 Class contracts for an additional $53 million. The Navy could not accept that offer since it covered a claim which had not yet been presented.

Shortly after the $97 million settlement, Deputy Secretary of Defense Clements introduced his plan to settle shipbuilding claims using Public Law 85-804. Under that plan, General Dynamics and the Defense Department reached tentative agreement to settle all remaining claims on the two SSN 688 Class contracts at Electric Boat for about $170 million—almost $120 million more than the company's previous settlement offer. As late as November, 1976, General Dynamics was still asking the Defense Department to accept the $170 million Public Law 85-804 claims settlement.

By February 1977, however, the company's cost estimates for the SSN 688 Class construction program increased such that even a $170 million settlement would have left the company deeply in the red. Moreover, costs have been overrunning so that even if the Government had in February, 1977, paid Electric Boat all losses being projected at that time, the company would again find itself in a substantial loss position by the 1st of December. Had the Government paid off the losses being projected on the 1st of December, the company would again find itself in a projected loss position as of today. To anyone considering a one-time payoff as a solution to the shipbuilding claims problem this should be a sobering thought.

In extraordinary cases where the Government decides to bail out a shipbuilder under Public Law 85-804, the Navy should ensure future access to the shipyard's production facilities. This could be done by buying the shipyard and having a contractor operate it as a Government-owned, Contractor-operated plant. Alternatively, the Navy might be able to enter into a long-term leasing arrangement so that if the contractor subsequently threatened to deny the facilities for Navy work, the Navy could make them available to another contractor.

My proposal to acquire certain shipyards and operate them as Government-owned, contractor-operated plants rather than just to reform contracts in response to shipbuilder threats has been criticized as an attempt to nationalize the shipyards, and as being contrary to the "free enterprise" system and defense procurement policies.

It is not, nor is it meant to be, a punitive measure, as some have suggested, nor a method for the Navy to run private shipyards. What I envision already exists throughout Defense procurement, in the Department of Energy, and elsewhere. In many places, the Government owns the production facilities and a contractor manages them for the Government. That is supposed to give the Government the benefits of private industry in cases where the Government owns the facilities.

Personally, I have always advocated relying on private industry to provide the facilities as well as the management expertise needed to fulfill the Government's needs.
But if the Navy excuses a shipbuilder from a contract,it may again find itself faced with threats of work stoppage or refusals to take new business whenever the shipbuilder wants his contracts repriced.

Keep in mind I am only advocating the Government-owned, contractor-operated plant approach in cases where the Government decides it must bail out an essential shipbuilder. Moreover, I advocate the Government paying fair value for any shipyard it would acquire under these circumstances as part of the overall settlement so that the Government would not in any sense be confiscating private property.

The last minute withdrawal of the Electric Boat claim from the Navy Claims Settlement Board and a new agreement to defer litigation on the Litton contract dispute indicate the possibility of another effort to settle the claims at these two yards on other than their legal merits. As I have previously explained, I believe the Government should enforce its contracts. However, I also recognize that senior Defense officials have responsibilities far broader than my own and may, for their own reasons, arrive at different conclusions.

Defense officials have the authority to settle claims by granting extra-contractual relief under Public Law 85-804 whenever they determine this would facilitate national defense. In such cases, however, great care should be taken.

I believe that the following criteria should be applied in resolution of the claims on a basis other than strict legal entitlement:

- The true financial condition of the corporation should be determined by Government audit. Corporate officials sometimes tend to exaggerate the severity of their financial situation in dealing with Government officials.
- Attempts to reach an overall settlement of shipbuilding claims should in no way prejudice the Government's ability to enforce the terms and conditions of existing Government contracts.
- The worth of the claims should be determined. The Navy, the Congress, and the public should know just how much of the amount claimed is valid.
- The provision of extra-contractual relief should not in any way excuse a contractor from any legal liability

he might have under Federal fraud or false claims statutes.

- The settlement should not establish a precedent which the Navy would be unwilling to apply to other claims-troubled contractors if they are essential to national defense and if their continued ability to perform is in jeopardy.
- The Government should try to get back, to the greatest extent possible, as much in value as it gives up.
- The settlement should guarantee the future availability of facilities to the Navy well into the future -- say 25-50 years, together with the contractual right to change contractors. In this way, the Navy will not continue to be vulnerable to threats of work stoppage whenever a shipbuilder encounters financial problems.
- The settlement should specify how subcontracts should be handled. Shipbuilders should not be permitted to later bail out subcontractors at Government expense.
- The settlement should constitute a one-time permanent solution at that shipyard so that the Government does not again find itself in the dilemma of having to choose between getting ships and enforcing contracts.

THIS STATEMENT REFLECTS THE VIEWS OF
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
THE NAVY OR THE DEPARTMENT OF THE NAVY

STATEMENT
OF
ADMIRAL H. G. RICKOVER, USN
DIRECTOR
NAVAL NUCLEAR PROPULSION PROGRAM
BEFORE
THE DEFENSE SUBCOMMITTEE OF THE
COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

MAY 5, 1981

New warships authorized and funded by Congress this year will be operating well into the 21st century. They should be versatile platforms capable of carrying whatever weapons then exist to any part of the world, without being limited by the availability of oil. The importance of this has been demonstrated once again by the performance of our nuclear ships in the Indian Ocean.

Current Navy shipbuilding plans which call for construction of more ships than have been built in past years will require an expansion of the shipbuilding industry workforce. During the 1970's large management problems during manpower buildups at Electric Boat, Newport News, and Ingalls led to extensive cost

AND SCHEDULAR PROBLEMS, AND ULTIMATELY A $2.7 BILLION BACKLOG OF UNSETTLED CLAIMS AGAINST THE NAVY. IN UNDERTAKING AN EXPANDED SHIPBUILDING PROGRAM, CONGRESS AND THE DEFENSE DEPARTMENT WILL NEED TO ENSURE THAT THESE PROBLEMS DO NOT RECUR. CONGRESS ALSO NEEDS TO UNDERSTAND AND HELP THE NAVY RESOLVE THE CONTRACTUAL PROBLEMS THAT PERVADE THE SHIPBUILDING INDUSTRY.

OVER THE PAST DECADE, THE NAVY HAS NOT BEEN EFFECTIVE IN DEALING WITH SHIPBUILDERS THAT ARE NOT PERFORMING EFFICIENTLY, THAT DELIBERATELY UNDERBID, OR THAT HARASS THE GOVERNMENT WITH FRIVOLOUS OR INFLATED CLAIMS. THE TRADITIONAL CONTRACTUAL AND LEGAL REMEDIES AGAINST CONTRACTORS WHO DO NOT HONOR THEIR CONTRACTS OFTEN PROVE TO BE WORTHLESS IN NAVY SHIP CONSTRUCTION WORK. THE SITUATION THAT EXISTS IN THE NAVY SHIPBUILDING BUSINESS TODAY IS CONDUCIVE NEITHER TO ECONOMY, EFFICIENCY, NOR QUALITY.

THERE ARE SEVERAL REASONS FOR THIS SITUATION. THERE IS LITTLE OR NO TRUE COMPETITION IN BIDDING FOR THE CONTRACTS TO BUILD THE NAVY'S SHIPS. EVEN WHEN THE NAVY IS NOT DEPENDENT ON A SOLE SOURCE, THE LOW BIDDER IN COMPETITIVE SOLICITATIONS IS NOT ALWAYS THE MOST EFFICIENT SHIPBUILDER. NOR DOES HE ALWAYS BUILD AND DELIVER SHIPS AT THE LOWEST COST TO THE GOVERNMENT. THE STANDARD PROFIT INCENTIVES ARE NOT WORKING WITH SOME LARGE SHIPBUILDERS. IT HAS BECOME FAR EASIER, AND MORE LUCRATIVE, FOR SHIPYARD OFFICIALS TO INFLATE CONTRACT PRICES AFTER CONTRACT AWARD THROUGH CHANGES AND CLAIMS THAN TO ACHIEVE GREATER EFFICIENCY IN THE SHIPYARD.

BECAUSE OF THE NEED FOR EXTENSIVE INTERACTION BETWEEN THE

NAVY AND ITS SHIPBUILDERS DURING THE SHIP CONSTRUCTION PROCESS, THERE IS AMPLE OPPORTUNITY FOR A SHIPBUILDER TO ASSERT CLAIMS. IN SOME CASES THERE IS A VALID BASIS FOR A CLAIM. HOWEVER, SHIPBUILDER CLAIMS OFTEN INCLUDE LARGE SUMS FOR WHICH THE GOVERNMENT IS NOT LIABLE. THESE CLAIMS ARE FREQUENTLY PRESENTED IN SUCH A WAY THAT THEY BECOME ALMOST IMPOSSIBLE TO EVALUATE. OUR TWO MAJOR SHIPYARDS ARE UNDER INVESTIGATION BY THE DEPARTMENT OF JUSTICE FOR POSSIBLE FRAUD IN CONNECTION WITH PAST CLAIMS - A THIRD YARD HAS BEEN INDICTED.

LARGE, OMNIBUS CLAIMS CAN INVOLVE HUNDREDS OR EVEN THOUSANDS OF ALLEGATIONS SPREADING OVER MANY YEARS. UNDER THESE CIRCUMSTANCES IT IS VIRTUALLY IMPOSSIBLE FOR SENIOR DEFENSE OFFICIALS, JUDGES, MEMBERS OF CONGRESS, THE PRESS, OR ANY OUTSIDE PARTY TO SORT OUT THE FACTS AND DEAL WITH ISSUES ON THEIR MERITS. THIS SITUATION TIES THE GOVERNMENT IN KNOTS AND DIVERTS ATTENTION FROM PRODUCTIVE WORK - LITERALLY FOR YEARS AT A TIME.

FOR THE PAST DECADE, CONTRACT TERMS ON SHIPBUIDING CONTRACTS HAVE BECOME MORE LIBERAL AS SHIPBUILDERS HAVE AN INCREASINGLY GREATER SAY AS TO WHAT TERMS AND CONDITIONS THE NAVY WILL USE TO PROCURE ITS SHIPS.

PROBLEMS IN COMPETITIVE BIDDING FOR NAVAL WARSHIPS

THE NAVY NORMALLY RELIES ON COMPETITIVE BIDDING OF FIXED PRICE CONTRACTS WHENEVER MORE THAN ONE CONTRACTOR CAN BUILD THE SHIPS NEEDED. HOWEVER, THE COMPETITIVE BIDDING SYSTEM IN SHIPBUILDING IS BEING SUBVERTED BY REPEATED UNDERBIDDING AND SUBSEQUENT ATTEMPTS TO RECOVER LOSSES BY CLAIMS.

The underlying premise of competitive bidding is that over the long run an efficient company will reap rewards in the form of more business and higher profits while inefficiency leads to declining business and losses. In Naval ship procurement, however, this premise has not been holding true.

There have been two shipbuilders in the Navy's SSN 688 Class submarine construction program. Electric Boat has won contracts for a total of 20 ships. Newport News has contracts for only 13. Yet, Newport News has been and continues to be by far the more efficient of the two shipbuilders.

For the first five ships delivered, Electric Boat's costs averaged 50 percent more than the costs Newport News incurred on its first five ships. Newport News spent an average $98 million per ship; Electric Boat spent $148 million. In addition Electric Boat expended 26 percent more manhours to build its first five ships than Newport News expended.

For the following five ships, current projections indicate that Electric Boat will probably expend 30 percent more manhours than Newport News will expend. Direct cost comparisons for these five ships are distorted because the contract for the Newport News ships was awarded in 1977 – two to four years later than the corresponding Electric Boat contracts. Thus labor and material costs at Newport News should be higher due to inflation. Nonetheless, Newport News' projected costs at completion for these ships are, on the average, about $25 million per ship lower than Electric Boat's.

The performance difference shows up also in ship deliveries. This year Electric Boat delivered its sixth SSN 688 Class submarine - four years later than the original contract delivery date. Newport News also delivered its sixth SSN 688 Class submarine this year - eight months later than the original contract delivery date.

Of course manhour and cost projections on uncompleted ships are only shipbuilder estimates which can and do change. However, Electric Boat has historically made excessively optimistic cost projections while Newport News, in recent years, has tended to be conservative.

Despite past performance, Electric Boat seems always in a position to be the low bidder, simply by projecting future productivity improvements. After the 1978 P.L. 85-804 claims settlement, for example, Electric Boat again underbid Newport News for two SSN's Congress authorized for fiscal years 1978 and 1979. The Navy informed Electric Boat that the Navy considered the company's bid was unrealistically low; Electric Boat insisted it was not. Although officials of the Naval Sea Systems Command were convinced that the Navy would ultimately save money on these ships by awarding to Newport News, Navy lawyers advised that the contract had to be awarded to the low bidder, Electric Boat.

Apparently Electric Boat's bidding tactics were aimed at trying to force Newport News out of the business. The Chairman of the Board of General Dynamics told Electric Boat employees

SHORTLY AFTER RECEIVING THIS CONTRACT, "BECAUSE WE'RE IN THE SUBMARINE BUSINESS WE WANT TO BE THE ONLY ONE AND THE BEST ONE WITHOUT ANY QUESTION."

IN AN EFFORT TO SUSTAIN A SUBMARINE CONSTRUCTION CAPABILITY AT NEWPORT NEWS IN THE FACE OF ELECTRIC BOAT'S AGGRESSIVE AND UNREALISTIC BIDDING, SENIOR MILITARY OFFICIALS ON TWO SEPARATE OCCASIONS IN 1979 SOUGHT SECRETARY OF THE NAVY APPROVAL TO ALLOCATE THE NAVY'S NEXT TWO SSN'S TO NEWPORT NEWS. IN BOTH CASES THE REQUEST WAS DISAPPROVED. FORMER SECRETARY OF THE NAVY HIDALGO ORDERED THAT THESE SHIPS SHOULD BE "COMPETED" AND ELECTRIC BOAT ONCE AGAIN SUBMITTED THE LOW BID.

SECRETARY OF THE NAVY LEHMAN, UPON TAKING OFFICE, RECOGNIZED THE NEED TO KEEP NEWPORT NEWS IN THE SUBMARINE CONSTRUCTION BUSINESS AND AUTHORIZED SOLE SOURCE NEGOTIATIONS WITH THAT YARD FOR THOSE TWO SSN'S AND AN ADDITIONAL ONE THAT CONGRESS HAD SUBSEQUENTLY AUTHORIZED. PROVIDING THAT NEWPORT NEWS ACCEPTS THE NAVY'S TERMS AND CONDITIONS, THE NAVY WILL BE IN A POSITION TO KEEP ITS MOST EFFICIENT YARD BUILDING SUBMARINES.

THIS EXPERIENCE HIGHLIGHTS THE NEED FOR STATUTORY OR REGULATORY AUTHORITY THAT WILL ENABLE THE NAVY TO FRUSTRATE A BUY-IN ATTEMPT BY REJECTING AN UNREASONABLY LOW BID. WERE IT NOT FOR THE NEED TO KEEP NEWPORT NEWS INVOLVED IN THE SUBMARINE CONSTRUCTION BUSINESS, THE NAVY MIGHT HAVE BEEN FORCED TO CONTINUE AWARDING SSN'S TO ELECTRIC BOAT, EVEN THOUGH IT WOULD NOT BE IN THE NATIONAL INTEREST TO DO SO.

BY CONSISTENTLY UNDERBIDDING ITS MORE EFFICIENT COMPETITOR, AND THEN FAILING TO PERFORM AS PREDICTED, ELECTRIC BOAT HAS CAUSED THE NAVY NO END OF PROBLEMS. SHIP DELIVERIES HAVE BEEN YEARS LATER THAN AT NEWPORT NEWS. CONSTRUCTION DELAYS HAVE TIED UP SCARCE NAVY CREWS USELESSLY AT THE SHIPYARD AWAITING SHIP DELIVERY. BY DEPRIVING NEWPORT NEWS OF SUBMARINE BUSINESS THE NAVY IS HAVING TO PAY FOR A COSTLY BREAK IN PRODUCTION AT NEWPORT NEWS. MOREOVER, THROUGH CLAIMS, ELECTRIC BOAT HAS BEEN ABLE TO PASS ON THEIR OWN HIGHER COSTS TO THE NAVY, THUS ERASING COMPLETELY ANY APPARENT COST SAVINGS ARISING FROM HAVING AWARDED THESE CONTRACTS TO THE LOW BIDDER.

IN JUNE 1978, TO SETTLE THE ELECTRIC BOAT CLAIMS, FORMER SECRETARY OF THE NAVY CLAYTOR AGREED TO THE FOLLOWING TERMS:

A. THE NAVY PAID ELECTRIC BOAT THE MAXIMUM AMOUNT IT COULD JUSTIFY THE CLAIMS WERE WORTH - $125 MILLION.

B. THE NAVY AGREED TO PAY $359 MILLION IN EXTRA CONTRACTUAL RELIEF IN RETURN FOR WHICH ELECTRIC BOAT WOULD ACCEPT A $359 MILLION LOSS.

C. THE NAVY WOULD SHARE FURTHER OVERRUNS 50-50 UP TO A MAXIMUM ADDITIONAL NAVY LIABILITY OF $50 MILLION.

D. THE NAVY WOULD ABSORB ALL INFLATION COSTS IN EXCESS OF 7 PERCENT FOR LABOR AND 6 PERCENT FOR MATERIAL FOR THE REMAINDER OF THE CONTRACT.

AS A RESULT OF EVENTS SUBSEQUENT TO THE CLAIM SETTLEMENT, THE NAVY NOW ESTIMATES IT WILL HAVE TO PAY $50 MILLION FOR ITS SHARE OF ELECTRIC BOAT'S COST OVERRUNS AND $105 MILLION AS A RESULT OF INFLATION BEYOND 7 PERCENT FOR LABOR AND 6 PERCENT

FOR MATERIAL. COUNTING A PRIOR $97 MILLION CLAIM SETTLEMENT, THE NAVY WILL END UP PAYING ELECTRIC BOAT $222 MILLION IN CLAIM SETTLEMENTS ON THE SSN 688 PROGRAM AND AN ADDITIONAL $514 MILLION IN EXTRA CONTRACTUAL RELIEF.

THROUGH THE CLAIM SETTLEMENTS AND EXTRA CONTRACTUAL RELIEF, THEREFORE, THE NAVY HAS UPPED THE PRICE OF THESE SHIPS BY AN AVERAGE OF $40.8 MILLION EACH FOR 18 SHIPS. ELECTRIC BOAT AGREED TO ABSORB AS A LOSS ABOUT $20 MILLION PER SHIP.

IN 1978, THE NAVY ALSO SETTLED NEWPORT NEWS' CLAIMS ON THE SSN 688 CLASS SUBMARINE PROGRAM. THE NAVY PAID NEWPORT NEWS $63.7 MILLION AGAINST THE CLAIMS PLUS $5 MILLION IN EXTRA CONTRACTUAL RELIEF – AN AVERAGE OF $13.7 MILLION PER SHIP FOR 5 SHIPS.

NEWPORT NEWS NOW APPEARS TO BE HEADED FOR A SUBSTANTIAL PROFIT ON ITS LATER SSN 688 CLASS SHIPS AND, THEREFORE, NO LARGE CLAIMS ARE EXPECTED. ELECTRIC BOAT, HOWEVER, HAS EXPERIENCED EXTENSIVE AND WELL-PUBLICIZED PROBLEMS INVOLVING ITS OWN DEFECTIVE MATERIAL AND WORKMANSHIP IN BOTH THE SSN 688 AND TRIDENT PROGRAMS. THE COMPANY HAS ANNOUNCED IT WILL ATTEMPT TO RECOVER THE EXTRA COST OF THESE PROBLEMS THROUGH INSURANCE CLAIMS AGAINST THE GOVERNMENT. THE COMPANY HAS SAID THESE CLAIMS WILL APPROACH $100 MILLION. I PREDICT THAT BEFORE WE ARE THROUGH, ELECTRIC BOAT CLAIMS WILL BE FAR HIGHER THAN THIS.

PROBLEMS IN SOLE SOURCE PROCUREMENT OF NAVAL WARSHIPS

THE NAVY HAS LITTLE OR NO LEVERAGE IN NEGOTIATIONS WITH A SOLE SOURCE SHIPBUILDER ONCE FUNDS HAVE BEEN AUTHORIZED AND

APPROPRIATED BY CONGRESS. IF ONLY ONE FIRM HAS THE REQUISITE FACILITIES AND EXPERTISE IT CAN EFFECTIVELY DICTATE TERMS AND CONDITIONS UNDER WHICH THE NAVY WILL BUY A SHIP. FOR EXAMPLE, ELECTRIC BOAT RECENTLY USED ITS SOLE SOURCE POSITION ON TRIDENT SUBMARINES TO EXACT NAVY AGREEMENT TO PAY THE PREMIUMS FOR AN INSURANCE POLICY FROM LLOYD'S OF LONDON TO COVER THE RISK OF ITS OWN DEFECTIVE MATERIAL AND WORKMANSHIP. ELECTRIC BOAT ALSO INSISTED ON A LOOPHOLE IN THE NAVY'S NEW "NOTIFICATION OF CHANGES" CLAUSE WHICH PRESERVES FOR THE COMPANY THE ABILITY TO GENERATE LARGE CLAIMS YEARS AFTER THE FACT - EXACTLY THE OPPOSITE OF WHAT THE NAVY IS TRYING TO ACCOMPLISH WITH THE CLAUSE.

NEWPORT NEWS INSISTED UPON AND OBTAINED IN THE CVN 71 SHIPBUILDING CONTRACT A SPECIAL CLAUSE UNDER WHICH THE GOVERNMENT MUST ADJUST THE CONTRACT PRICE FOR DELAYS CAUSED BY ENERGY SHORTAGES - A CLAUSE NOT GENERALLY GIVEN TO ANY OTHER CONTRACTORS. THE ORDERING OF LONG LEADTIME MATERIALS FOR CONSTRUCTION OF CVN 71 WAS DELAYED ABOUT FOUR MONTHS BEFORE THE NAVY WAS FINALLY ABLE TO GET NEWPORT NEWS' AGREEMENT TO COMPLY WITH THE REQUIREMENTS MANDATED BY CONGRESS FOR CERTIFICATION OF CLAIMS.

THE NAVY IS ALSO AT A DISADVANTAGE IN PRICE NEGOTIATIONS WITH SOLE SOURCE CONTRACTORS. FOR EXAMPLE, DURING NEGOTIATIONS FOR THE CVN 71, NEWPORT NEWS PROPOSED OVER 2 MILLION MANHOURS MORE THAN THE COMPANY WAS THEN PROJECTING AS NECESSARY FOR THE CONSTRUCTION OF THE PREDECESSOR SHIP, CVN 70. ALTHOUGH CVN 71 WAS THE FOURTH SHIP OF THE CLASS BUILT BY THIS SHIPYARD, WITH ONLY MINOR DIFFERENCES IN SPECIFICATIONS BETWEEN THE SHIPS, Newport News contended it now has a younger workforce that will be less efficient. Although the Navy strongly disagreed with the estimate, it was unsuccessful in negotiating these additional manhours out of the Newport News proposal.

Similarly, Newport News recently began adding a contingency to submarine overhaul contract price proposals on the theory that increased submarine overhaul workload would reduce efficiency. To evaluate the company's estimate the Navy repeatedly requested Newport News to provide information such as the need for new hires, the duration of inefficiency, and the basis of the "inefficiency factor" applied. The contractor refused to provide such supporting data. Because the work needed to get started, the Navy eventually had to sign the contract with an unsubstantiated $1.5 million included for this alleged inefficiency.

PROBLEMS WITH INCENTIVE CONTRACTS

For a shipbuilder it is often easier to increase profits by negotiating higher prices than it is to earn incentive profits by actual cost reduction. For example, Newport News and the Navy typically negotiate a target profit for submarine overhaul work of about 10 percent of the estimated cost of the job. By the time the job is done, and the contract price adjusted upward for changes, Newport News has been averaging 17.6 percent profit on incurred costs and up to 70 percent return on investment calculated in terms Tenneco uses to judge the performance of its divisions. Typically the final cost for the entire

SUBMARINE OVERHAUL, INCLUDING CHANGES, TURNS OUT TO BE ABOUT EQUAL TO THE ORIGINAL NEGOTIATED TARGET COST, WITHOUT CHANGES. SINCE THE PRICE HAS BEEN INCREASED FOR CHANGES NEWPORT NEWS REALIZES A LARGE COST UNDERRUN, THUS QUALIFYING FOR THE MAXIMUM INCENTIVE FEE.

ON RECENT SOLE SOURCE, FIRM FIXED PRICE CONTRACTS FOR POST SHAKEDOWN AVAILABILITIES OF NEW CONSTRUCTION SUBMARINES, NEWPORT NEWS HAS BEEN REALIZING AN AVERAGE PROFIT OF 21 PERCENT OF INCURRED COST. ON THE AVERAGE, AFTER THE SHIP HAS LEFT THE YARD AND ALMOST ALL COSTS INCURRED, THE PRICES OF THESE CONTRACTS ARE INCREASED BY 30 PERCENT TO REFLECT THE ALLEGED EFFECT OF CONTRACT CHANGES MADE DURING THE AVAILABILITY. THE QUESTION IS WHETHER THE HIGH PROFITS NEWPORT NEWS HAS BEEN REALIZING ON THESE CONTRACTS REFLECT TRUE COST REDUCTION OR PRICE GOUGING.

DETAILED DATA ON THE ABOVE EXAMPLES IS SHOWN IN THE TABLES ATTACHED TO THIS STATEMENT.

CONTRACT CLAIMS

IN INDUSTRIES WHERE THERE IS TRUE COMPETITION, OR WHERE A FEW COMPANIES SELL TO MANY CUSTOMERS, A CONTRACTOR WHO FAILS TO DELIVER WITHIN THE CONTRACT AMOUNT HAS A HARD TIME TRYING TO BLAME HIS PROBLEMS ON THE CUSTOMERS. IN THE SHIPBUILDING INDUSTRY, HOWEVER, THE NAVY IS THE SOLE CUSTOMER AND MUST PROVIDE MOST OF THE DRAWINGS AND SOPHISTICATED EQUIPMENT USED IN CONSTRUCTING MAJOR COMBATANT SHIPS. THUS IF A SHIPBUILDER GETS INTO TROUBLE, EITHER THROUGH POOR PERFORMANCE OR FROM HAVING DELIBERATELY UNDERBID THE CONTRACT, CHANCES ARE GOOD THAT HE CAN

FIND A WAY TO BLAME THE NAVY AND TRY TO REPRICE THE CONTRACT THROUGH CLAIMS.

SOME LAW FIRMS NOW SPECIALIZE IN CONTRACT CLAIMS – PARTICULARLY SHIPBUILDING CLAIMS AGAINST THE NAVY. MANY FORMER GOVERNMENT ATTORNEYS FILL THEIR RANKS. THESE FIRMS ARE THE "AMBULANCE CHASERS" OF THE WASHINGTON BAR, AND THEY GUIDE SHIPBUILDERS IN PREPARING AND PROSECUTING THEIR CONTRACT CLAIMS AGAINST THE NAVY. RATHER THAN PROMOTING JUSTICE AS OFFICERS OF THE COURT, MANY CLAIMS LAWYERS USE THEIR SKILLS TO CLOUD ISSUES, HARASS THE GOVERNMENT, AND FRUSTRATE PROMPT RESOLUTION OF DISPUTES – EXCEPT ON THE CLIENT'S TERMS.

THE CLAIMS THEY SUBMIT ARE GENERALLY CONSTRUCTED TO OBFUSCATE RATHER THAN ILLUMINATE. A NEWSPAPER RECENTLY QUOTED ONE PROMINENT WASHINGTON CLAIMS LAWYER AS SAYING THAT A LARGE, OMNIBUS CLAIM "SHOULD BE LIKE AN IMPRESSIONIST PAINTING. YOU DON'T HAVE TO FILL IN EVERY DETAIL TO KNOW WHAT IS PICTURED. A FEW DABS HERE AND IT'S A NUDE WOMAN; A FEW DABS THERE, AND IT IS A DOG." A FORMER LITTON EXECUTIVE CHARACTERIZED THE CLAIMS PROCESS THIS WAY: "THE WHOLE PROCESS IS A CHARADE. THE LAWYERS ARE JUST USED TO STALLING AND DELAYING UNTIL THE EXECUTIVES CAN SIT DOWN WITH THE TOP PEOPLE IN THE ARMED FORCES AND MAKE A DEAL."

THE CLAIMS LAWYERS CONSTITUTE AN INDUSTRY WITHIN THE DEFENSE INDUSTRY, COMPLETE WITH ITS OWN LOBBYING ORGANIZATION AND OBJECTIVES – AN INDUSTRY THAT DEPENDS FOR ITS SURVIVAL ON THE PERPETUATION OF CLAIMS AND CONTRACT DISPUTES. THE AMERICAN BAR

Association has lent its prestige to the activities of a few claims lawyers who, in the name of the Association, have been promoting legislation and regulations designed to make it even harder for the Government to protect itself against frivolous, inflated or unsubstantiated claims. The American Bar Association (ABA) has also been trying to water down proposed statutes and regulations which provide sanctions against submission of false claims.

I have written repeatedly to the ABA to be sure that organization is aware of the activities of these claims lawyers and the harm they are doing to the public. As you might expect the past two presidents of the ABA have concluded that their representatives have been conducting themselves in the public interest.

Shipbuilders and their claims lawyers have shown that they can even delay adjudication of relatively simple disputes almost indefinitely. In 1972, for example, the Navy and Electric Boat entered into an agreement which set a ceiling on overhead costs that would be allowed under Government contracts for 1972 through 1975. In 1977, the Navy contracting officer issued formal decisions to the effect that Electric Boat owed the Navy about $28 million in overpayments under the agreement. Electric Boat hired claims lawyers who challenged the agreement to the Armed Services Board of Contract Appeals. Today, over four years after the company filed its appeal, the Board has yet to hear the case. Meanwhile, Electric Boat continues to have use of the $28 million.

THIS DISPUTE IS OVER THE INTERPRETATION OF A FEW PARAGRAPHS IN A FOUR PAGE, DOUBLE SPACED, DOCUMENT. SHIPBUILDING CONTRACTS WITH THEIR THOUSANDS OF PAGES OF SPECIFICATIONS AND DRAWINGS, AND THE PILES OF CORRESPONDENCE INVOLVED IN ADMINISTERING THEM, OFFER AN EVEN GREATER TARGET OF OPPORTUNITY FOR CLAIMS LAWYERS. DURING THE 1970'S FOR EXAMPLE, NEWPORT NEWS SUBMITTED CLAIMS TOTALING NEARLY $900 MILLION IN 64 BOUND VOLUMES, EACH ABOUT TWO AND ONE-HALF INCHES THICK. EVALUATING SUCH CLAIMS BECOMES A HERCULEAN TASK FOR GOVERNMENT PERSONNEL.

CLAIMS LAWYERS AND THEIR CLIENTS KNOW THEY CAN EASILY TIE UP THE NAVY IN COURT FOR A DECADE OR MORE WITH AN OMNIBUS SHIPBUILDING CLAIM. AS TIME PASSES, GOVERNMENT OFFICIALS COME AND GO, MEMORIES FADE, WITNESSES GET HARDER TO FIND, AND THE PRESSURE ON GOVERNMENT OFFICIALS TO REACH A COMPROMISE SETTLEMENT GROWS. THIS ALL WORKS TO THE ADVANTAGE OF THE SHIPBUILDER WHO HAS SUBMITTED AN INFLATED CLAIM.

FROM A CONTRACTOR'S VIEWPOINT IT OFTEN PAYS TO SUBMIT A CLAIM EVEN IF HE HAS NO CASE WHATSOEVER. CHANCES ARE THAT HE WILL GET A SETTLEMENT THAT WILL MORE THAN TAKE CARE OF HIS EXPENSES.

SIGNIFICANCE OF UNSETTLED CLAIMS IN CORPORATE PROFIT REPORTS

UNSETTLED CLAIMS HAVE BEEN INVALUABLE TO SHIPBUILDERS AND THEIR PARENT CONGLOMERATES AS A WAY TO MANIPULATE PROFIT FIGURES REPORTED TO STOCKHOLDERS.

PRIOR TO THE P.L. 85-804 SETTLEMENT IN JUNE 1978, ELECTRIC BOAT ESTIMATED THE COST OF COMPLETING THEIR SSN 688 CONTRACTS

WOULD BE $840 MILLION ABOVE THE CONTRACT CEILING PRICE. BY VALUING ITS UNSETTLED SHIPBUILDING CLAIMS AT THIS SAME AMOUNT, ELECTRIC BOAT WAS ABLE TO REPORT THE SSN 688 CONSTRUCTION CONTRACTS AS A "NO-PROFIT, NO-LOSS" PROPOSITION.

THE RECORD PROFIT GENERAL DYNAMICS REPORTED FOR 1977 – $103 MILLION – WAS PREDICATED ON ELECTRIC BOAT RECOVERING FROM THE NAVY EVERY CENT OF THE COMPANY'S $840 MILLION ANTICIPATED OVERRUN. IF GENERAL DYNAMICS HAD ADMITTED THAT AS LITTLE AS 13 PERCENT OF THE OVERRUN WAS ELECTRIC BOAT'S RESPONSIBILITY, THE ENTIRE CORPORATION WOULD HAVE HAD TO REPORT A LOSS RATHER THAN RECORD PROFITS FOR 1977.

WHEN ELECTRIC BOAT AGREED TO THE NAVY'S SETTLEMENT, GENERAL DYNAMICS HAD TO WRITE OFF AND REPORT TO STOCKHOLDERS IMMEDIATELY A $359 MILLION LOSS – THE FIRST AND ONLY TIME GENERAL DYNAMICS HAS HAD TO ACKNOWLEDGE A LOSS ON ITS SSN 688 CONTRACTS, DESPITE THE LARGE OVERRUNS THAT HAD BEEN BUILDING UP OVER THE YEARS. THIS $359 MILLION LOSS MORE THAN ERASED THE RECORD 1977 PROFITS REPORTED JUST A FEW MONTHS EARLIER. IN FACT, THIS LOSS WAS GREATER THAN THE TOTAL PROFITS EARNED BY ELECTRIC BOAT IN BUILDING NUCLEAR SUBMARINES SINCE NAUTILUS.

BY BEING ABLE TO REPORT THE LOSS AND THE SETTLEMENT SIMULTANEOUSLY, HOWEVER, GENERAL DYNAMICS WAS ABLE TO MAKE WHAT SHOULD HAVE BEEN BAD NEWS SOUND LIKE GOOD NEWS. THE PRICE OF GENERAL DYNAMICS STOCK INCREASED DRAMATICALLY. THE CORPORATION SUBSEQUENTLY REPORTED FOR 1978, THE YEAR OF THE SETTLEMENT: "NET EARNINGS FROM OPERATIONS INCREASED 34 PERCENT TO A RECORD

HIGH OF $138.6 MILLION (ALTHOUGH A NET LOSS OF $48.1 MILLION WAS RECORDED AFTER CONSIDERATION OF THE SSN 688 SETTLEMENT)."

As a result of the much publicized production and quality control problems at Electric Boat after the settlement, its SSN 688 Class submarine contracts are again expected to overrun. And again, General Dynamics is saying that the Government will end up paying for these problems as a result of insurance claims Electric Boat plans to submit.

Although Electric Boat has not yet submitted its claims, it contends that under the terms of its shipbuilding contracts the Navy has agreed to insure the company against the effects of the shipyard's own defective material and poor workmanship. The Navy rejects this Electric Boat claim theory completely. Presumably the company will again anticipate revenue on the premise that the Navy will pay the claim, whenever it is submitted. The insurance claim, of course, is simply a new wrinkle to the old claims game.

General Dynamics is not alone in using unsettled claims to cover up potential losses. Despite substantial overruns Litton was able to avoid reporting a loss on its contract for helicopter assault ships (LHA) until the actual date of the LHA claim settlement. Litton was able to do this simply by asserting that the company had valid claims against the Navy sufficient to cover the overruns. The Securities and Exchange Commission (SEC) recently announced that Litton lacked adequate grounds for not providing for a loss on the LHA contract in its

FINANCIAL STATEMENTS FILED WITH THE SEC BETWEEN 1973 AND 1978. THE SEC STATED: "RECOGNITION OF SUCH A LOSS WOULD HAVE SUBSTANTIALLY REDUCED LITTON'S REPORTED NET INCOME."

BY 1978 NEWPORT NEWS HAD SUBMITTED CLAIMS AGAINST THE NAVY TOTALING $894 MILLION IN AN EFFORT TO RECOVER ROUGHLY $200 MILLION. BY ASSUMING THE NAVY WOULD EVENTUALLY PAY THIS AMOUNT, THE YARD OFFICIALS WERE ABLE TO REPORT RECORD PROFITS AT THE SAME TIME THEY WERE COMPLAINING TO DEFENSE OFFICIALS THAT THEY WERE LOSING MONEY ON NAVY CONTRACTS. DURING SETTLEMENT NEGOTIATIONS, COMPANY OFFICIALS REFUSED TO SETTLE FOR ANYTHING LESS THAN THE COMPANY HAD ALREADY TAKEN CREDIT FOR IN ITS FINANCIAL REPORTS. WHEN THE NAVY'S EVALUATION OF THE VALUE OF THE CLAIMS FELL SHORT OF THIS AMOUNT, THE THEN ASSISTANT SECRETARY OF THE NAVY HIDALGO MADE UP THE DIFFERENCE BY AGREEING TO GRANT $23.2 MILLION IN EXTRA CONTRACTUAL RELIEF.

CONTRACT ADMINISTRATION PROBLEMS

OMNIBUS CLAIMS PROVIDE A WAY FOR CONTRACTOR OFFICIALS TO INSULATE CORPORATE PROFIT FIGURES FROM THE EFFECTS OF A POTENTIAL COST OVERRUN. THE ABILITY OF SHIPBUILDERS TO BOOK INCOME AGAINST UNSETTLED CLAIMS EXPLAINS WHY SOME SHIPBUILDERS HAVE DEVELOPED CADRES OF CLAIMS-MINDED PEOPLE WHO, FROM THE INCEPTION OF THE CONTRACT, SEEK TO SET UP THE NAVY FOR CLAIMS EVEN BEFORE THERE IS ANY INDICATION OF A PROBLEM. IT EXPLAINS WHY SOME SHIPBUILDERS RESIST CONTRACT REQUIREMENTS FOR PROMPT NOTIFICATION OF CLAIMS. IT EXPLAINS WHY THE NAVY HAS HAD TROUBLE SETTLING CLAIMS PROMPTLY ON THEIR MERITS. IT EXPLAINS WHY, DURING

CONTRACT NEGOTIATIONS, SOME SHIPBUILDERS OPPOSE SO VIGOROUSLY CONTRACT TERMS AND CONDITIONS THAT WOULD NARROW THE NAVY'S VULNERABILITY TO OMNIBUS CLAIMS.

STARTING LAST YEAR, ELECTRIC BOAT HAS BEEN REFUSING TO AGREE TO THE DELIVERY EFFECTS OF EVEN MINOR CHANGES. THE NAVY HAS THEREFORE BEEN FORCED INTO ISSUING UNPRICED CHANGES. AS A RESULT SHIPYARD OFFICIALS CAN NOW POINT TO MORE THAN 1,200 UNPRICED CHANGES WHICH REMAIN UNSETTLED ON THE FIRST TWO TRIDENT SHIPS ALONE – ENOUGH TO OBFUSCATE THE FACTS AND FORM THE BASIS FOR AN OMNIBUS CLAIM.

DEALING WITH NEWPORT NEWS IS ALSO DIFFICULT. ALTHOUGH NEWPORT NEWS IS REPORTING RECORD PROFITS, YARD OFFICIALS ARE STILL VERY MUCH INTERESTED IN PRESERVING FOR THE FUTURE THEIR ABILITY TO GENERATE OMNIBUS CLAIMS.

LAST YEAR I WAS UNABLE TO GET A VERY WORTHWHILE EQUIPMENT MODIFICATION ACCOMPLISHED DURING SHIP CONSTRUCTION BECAUSE NEWPORT NEWS INSISTED THAT THE PRICE FOR DOING THE CHANGE HAD TO INCLUDE SO-CALLED "CROSS-CONTRACT IMPACT" – A CLAIM THEORY THAT WOULD LET A SHIPBUILDER EFFECTIVELY REOPEN THE PRICE OF OTHER CONTRACTS BECAUSE OF THE CHANGE. TO AVOID SETTING THAT UNDESIRABLE PRECEDENT, I HAD TO PUT OFF THE MODIFICATION UNTIL THE SHIP'S FIRST REFUELING.

IN ANOTHER CASE THE NEWPORT NEWS MAXIMUM PRICE QUOTED TO OPEN AND INSPECT A MALFUNCTIONING VALVE INCLUDED A DEMAND FOR GOVERNMENT ACCEPTANCE OF A $6 MILLION MAXIMUM PRICE, A 38 DAY MAXIMUM DELAY FOR THE SHIP INVOLVED AND ALL FOLLOW SHIPS, ALLEGED

CROSS-CONTRACT IMPACT, AND A CHANGE TO CONTRACT REQUIREMENTS IN AN UNRELATED AREA. RATHER THAN AGREE TO THESE TERMS, THE NAVY DIRECTED NEWPORT NEWS TO PERFORM THE WORK WITHOUT AGREEING TO A PRICE. THE VALVE PROBLEM TURNED OUT TO BE A SHIPYARD RESPONSIBLE ITEM — A PIECE OF TARPAULIN-LIKE MATERIAL LEFT IN THE VALVE DURING SHIP CONSTRUCTION.

EVEN ON SMALL, RISK-FREE, COST REIMBURSEMENT CONTRACTS NEWPORT NEWS SEEMS TO BE TRYING TO WHEEDLE A LITTLE MORE FROM THE NAVY. RECENTLY THE COMPANY REFUSED TO ACCEPT A $22,000 EXTENSION OF AN ESSENTIAL COST TYPE DESIGN CONTRACT UNLESS THE HISTORICAL FEE RATE WAS INCREASED TO PROVIDE $330 MORE PROFIT.

AS YOU CAN SEE EVEN IN DEALING WITH A YARD LIKE NEWPORT NEWS, WHICH IS MAKING RECORD PROFITS, THE NAVY IS NOT ACTUALLY A CUSTOMER IN THE SENSE OF BEING SOMEONE WITH WHOM THE SUPPLIER TRIES TO ACCOMMODATE, SATISFY, AND MAINTAIN GOOD RELATIONS. THE SPECTER OF CLAIMS PERVADES MANY ASPECTS OF DAY-TO-DAY BUSINESS.

RELATIONS BETWEEN THE NAVY AND ITS SHIPBUILDERS

THROUGH LAX CONTRACT ENFORCEMENT AND LIBERAL CLAIMS SETTLEMENTS, THE NAVY ITSELF BEARS CONSIDERABLE RESPONSIBILITY FOR THE CLAIMS-ORIENTED ENVIRONMENT THAT HAS GROWN UP IN THE SHIPBUILDING INDUSTRY. WITH EACH NEW ADMINISTRATION ARRIVES A NEW NAVY SECRETARIAT COMPRISED OF CIVILIANS FROM OTHER WALKS OF LIFE.

SINCE THE MERE EXISTENCE OF OUTSTANDING CONTRACT DISPUTES IS OFTEN INTERPRETED AS EVIDENCE OF NAVY MISMANAGEMENT, THERE HAS ALWAYS BEEN CONSIDERABLE PRESSURE ON THESE OFFICIALS TO

SETTLE CLAIMS BY HORSETRADING RATHER THAN ENFORCING THE TERMS OF THE CONTRACT.

THE PAST TWO SECRETARIES OF THE NAVY RECEIVED GREAT CREDIT, IN CONGRESS AND ELSEWHERE, FOR SETTLING THE CLAIMS BACKLOG OF THE 1970'S. YET TO DO SO, THEY HAD TO GRANT SHIPBUILDERS HUNDREDS OF MILLIONS OF DOLLARS IN EXTRA CONTRACTUAL RELIEF. MOREOVER, THEY SETTLED THESE CLAIMS WITHOUT SEEKING AGREEMENTS THAT WOULD HELP PROTECT AGAINST A REPEAT OF THESE CLAIMS IN THE FUTURE. INSTEAD OF RESOLVING BASIC ISSUES, THE SETTLEMENTS SIMPLY CONFIRMED THAT SUBMITTING INFLATED, OMNIBUS CLAIMS AGAINST THE NAVY PAYS OFF.

COINCIDENT WITH ANNOUNCING THE PROPOSED SETTLEMENTS, THE SECRETARY ISSUED THE "NAVY SHIP PROCUREMENT PROCESS STUDY" WHICH MADE IT APPEAR THE NAVY WAS TAKING EFFECTIVE STEPS TO PRECLUDE RECURRENCE OF THE CLAIMS PROBLEMS. THE STUDY WAS LARGELY WINDOW-DRESSING. IT DID NOT GET TO THE HEART OF THE ISSUE.

CONTRARY TO POPULAR BELIEF, CONTRACT DISPUTES DO NOT ARISE FROM PERSONALITY CONFLICTS, EGOS, OR THE LIKE. MONEY IS THE ISSUE. TO GET THE MONEY THROUGH CLAIMS, A SHIPBUILDER MUST BLAME HIS PROBLEMS ON THE NAVY. IF THE NAVY CONCLUDES THE CLAIM IS INVALID, THERE DEVELOPS WHAT HAS BEEN COMMONLY REFERRED TO AS AN "ADVERSARY RELATIONSHIP" BETWEEN THE NAVY AND THE SHIPBUILDER. IN THIS ENVIRONMENT, CONSTANTLY URGING NAVY OFFICIALS TO REESTABLISH HARMONIOUS RELATIONS GENERATES PRESSURE ON THE NAVY TO PAY WHAT THE SHIPBUILDER WANTS.

NO AMOUNT OF CONGENIALITY WILL PERSUADE A SEASONED CONTRACTOR

TO SETTLE FOR LESS THAN HE THINKS HE CAN GET, OR TO ACCEPT A SETTLEMENT THAT WILL RESULT IN A LARGE LOSS — PARTICULARLY IF THE PARENT CORPORATION HAS INSTRUCTED HIM OTHERWISE.

THE GOVERNMENT REPRESENTATIVE IS AT ANOTHER DISADVANTAGE IN CONTRACT DISPUTES. AS A PUBLIC SERVANT, HE MUST LOOK AT THE FACTS OBJECTIVELY AND TRY TO BE COMPLETELY FAIR. A CONTRACTOR, HOWEVER, HAS ONLY HIS OWN INTERESTS AT STAKE AND IS NOT SO CONSTRAINED.

THE TOP MANAGEMENT POSITIONS AT PRIVATE SHIPYARDS HAVE BECOME PRIMARILY FINANCIAL AND POLITICAL JOBS. SHIPYARD GENERAL MANAGERS ARE GENERALLY BROUGHT IN FROM OUTSIDE THE YARD AND AFTER A FEW YEARS MOVE ON TO OTHER CORPORATE JOBS. FEW, IF ANY, STAY IN THE JOB LONG ENOUGH TO SEE ONE SHIP BUILT FROM START TO FINISH. EVEN WHEN THEY ARE IN CHARGE OF THE YARD, MUCH OF THEIR EFFORT SEEMS TO BE DEVOTED TO CORPORATE FUNCTIONS OUTSIDE THE YARD. AT BOTH ELECTRIC BOAT AND NEWPORT NEWS THE TOP YARD OFFICIAL IS AT THE YARD ONLY ABOUT TWO TO THREE DAYS A WEEK.

THE PREOCCUPATION OF MOST CONGLOMERATES WITH IMMEDIATE RESULTS TENDS TO SHIFT THE EMPHASIS OF SHIPYARD MANAGERS TOWARD FINANCIAL MATTERS, SUCH AS CLAIMS, RATHER THAN ON QUALITY AND PRODUCTION CONTROL. FOR MANY YEARS A LARGE STONE MONUMENT NEAR THE MAIN ADMINISTRATION BUILDING AT NEWPORT NEWS CARRIED A PLAQUE INSCRIBED AS FOLLOWS:

"WE SHALL BUILD GOOD SHIPS HERE
"AT A PROFIT - IF WE CAN
"AT A LOSS - IF WE MUST
"BUT ALWAYS GOOD SHIPS"

WHEN TENNECO TOOK OVER THE YARD, COMPANY OFFICIALS REMOVED THE PLAQUE AND SHIPPED IT OFF TO A LOCAL MUSEUM. THE MESSAGE CONVEYED THEREBY WAS UNMISTAKABLE.

TO A SHIPYARD EXECUTIVE THERE MAY BE SUBSTANTIAL REWARDS FOR TAKING A CLAIMS-ORIENTED APPROACH WITH THE NAVY. THE COST TO THE GOVERNMENT, HOWEVER, IS HIGH NOT ONLY IN THE EXCESSIVE AMOUNTS THAT MIGHT EVENTUALLY BE PAID UNDER THESE CLAIMS BUT MORE IMPORTANTLY IN DIVERTING NAVY AND SHIPYARD ATTENTION FROM PRODUCTIVE TASKS AND IN SOMETIMES DIVERTING NAVY BUSINESS TO YARDS THAT DO NOT PERFORM AS EFFICIENTLY AS THEIR COMPETITORS.

OUR ULTIMATE OBJECTIVE IS TO BUILD THE QUALITY SHIPS THE NAVY NEEDS QUICKLY, EFFICIENTLY AND TO A MINIMUM COST TO THE TAXPAYER. INSTEAD WE HAVE CREATED AN ENVIRONMENT CONDUCIVE TO INEFFICIENCY. THE ULTIMATE EFFECT WILL BE HIGHER FEDERAL EXPENDITURES AND A WEAKENED DEFENSE POSTURE.

THE NAVY NEEDS TO ESTABLISH A PROPER BUSINESS RELATIONSHIP WITH ITS SHIPBUILDERS; ONE IN WHICH THE NAVY IS THE CUSTOMER, NOT A "PARTNER." THE NAVY CANNOT EXECUTE A SHIPBUILDING PROGRAM EFFECTIVELY DEALING WITH FIRMS THAT DELIBERATELY BUY-IN ON COMPETITIVE PROCUREMENTS; TAKE UNFAIR ADVANTAGE IN SOLE SOURCE PROCUREMENTS; HARASS THE NAVY WITH OMNIBUS CLAIMS; REFUSE TO SETTLE THE PRICE OF CHANGES IN ADVANCE OF AUTHORIZATION; AND

TRY TO DICTATE THE CONTRACT TERMS AND CONDITIONS UNDER WHICH THE NAVY MUST BUY ITS SHIPS.

TO ESTABLISH A PROPER BUSINESS RELATIONSHIP THE NAVY NEEDS TO START USING WHAT BARGAINING POWER IT HAS, MAKING SURE THAT BUDGET DECISIONS REGARDING HOW MANY AND WHICH KINDS OF SHIPS ARE TO BE BOUGHT TAKE INTO ACCOUNT ANY OUTSTANDING BUSINESS PROBLEMS. BEFORE THE DEFENSE DEPARTMENT SEEKS CONGRESSIONAL APPROVAL OF FUNDS FOR SHIP CONSTRUCTION IT SHOULD KNOW THAT IT WILL BE ABLE TO CONTRACT FOR THESE SHIPS ON A PROPER BASIS IF CONGRESS PROVIDES THE FUNDS. IF THE DEFENSE DEPARTMENT IS UNABLE TO GET APPROPRIATE CONTRACTOR ASSURANCES ON AN IMPORTANT PROGRAM, IT WOULD AT LEAST BE IN A POSITION TO MAKE THE FACTS KNOWN TO CONGRESS AND SEEK LEGISLATIVE ASSISTANCE.

ALL INDICATIONS TODAY ARE THAT PROFIT INCENTIVES OF COMPETITIVE BIDDING AND FIXED PRICE CONTRACTING HAVE BEEN THOROUGHLY SUBVERTED BY LARGE SHIPBUILDERS AND THAT THESE INCENTIVES ARE ENCOURAGING UNDERBIDDING AND CLAIMS. IT MAY BE THAT THE NAVY CANNOT COME UP WITH A PRACTICAL WAY TO ENSURE THAT CONTRACTORS LIVE UP TO BOTH THE LETTER AND THE SPIRIT OF THE CONTRACTS – A PREREQUISITE TO MAKING TRADITIONAL INCENTIVES EFFECTIVE. IF SO, WE NEED TO FACE UP TO THIS FACT SQUARELY AND CONDUCT OUR SHIPBUILDING BUSINESS ON A BASIS THAT WOULD ELIMINATE ALTOGETHER INCENTIVES THAT ARE PROVING COUNTER-PRODUCTIVE.

AS AN ALTERNATIVE TO THE PRESENT SYSTEM, THE NAVY COULD CONTRACT FOR EXCLUSIVE USE OF MAJOR SHIPYARDS, ALLOCATE WORK TO

SHIPBUILDERS AS BEST SERVES THE NAVY'S NEEDS, AND PAY FOR THIS WORK ON A STRAIGHT COST REIMBURSEMENT BASIS, THUS ELIMINATING ANY RISK OF LOSS. TO ELIMINATE ANY INCENTIVES FOR SHIPBUILDERS TO INFLATE PRICES, GENERATE CLAIMS, OR INSTIGATE CONTRACT DISPUTES, THE NAVY COULD PAY THE SHIPYARDS A FLAT MANAGEMENT FEE -- WITH NO PROVISION FOR INCREASING OR DECREASING THE FEE FOR THE LIFE OF THE CONTRACT. PERHAPS IN THIS WAY WE COULD RECREATE A SITUATION AT THE SHIPYARDS WHICH WOULD BE MORE CONDUCIVE TO PRODUCTIVE AND QUALITY WORK.

ANOTHER ALTERNATIVE IS TO RESUME SHIP CONSTRUCTION AT NAVY SHIPYARDS. A RECENT NAVY STUDY CONCLUDED THAT AN EXPANSION OF THE NUCLEAR SUBMARINE CONSTRUCTION BASE IS NECESSARY AND THAT THE BEST WAY TO EXPAND THIS BASE IS TO USE A NAVY SHIPYARD.

CONSTRUCTION OF SUBMARINES IN A NAVY SHIPYARD WOULD PROVIDE NEEDED COMPETITION TO PREVENT PRIVATE SHIPYARDS FROM DICTATING THE TERMS AND CONDITIONS UNDER WHICH SHIPS ARE BUILT. THIS WOULD ALSO PROVIDE A BASIS OF COMPARISON TO DETERMINE THE REASONABLENESS OF PRIVATE SHIPYARD COSTS, ENHANCE THE NAVY IN-HOUSE CAPABILITY TO RESPOND TO SHIP REPAIR EMERGENCIES, AND PROVIDE EXPERTISE FOR THE NAVY TO OVERSEE PRIVATE SHIPYARD PROGRAMS.

A NAVY YARD WOULD ALSO INCREASE THE NAVY'S FLEXIBILITY IN AWARDING SUBMARINE CONSTRUCTION WORK AND REDUCE THE NUMBER OF SHIPS IN PROCESS AT ANY ONE SITE. THIS WOULD REDUCE THE EFFECT OF PRODUCTION OR QUALITY PROBLEMS ON AN ENTIRE SHIP CONSTRUCTION PROGRAM. USE OF A NAVY SHIPYARD WOULD REQUIRE A MINIMUM START UP

TIME BECAUSE OF CURRENT NUCLEAR SUBMARINE OVERHAUL EXPERIENCE, AVAILABILITY OF BASIC FACILITIES AND EQUIPMENT FOR NUCLEAR SUBMARINE CONSTRUCTION AND AN ONGOING TRAINING PROGRAM.

RECOMMENDATIONS

TO HELP GET NAVY SHIPS AS EFFICIENTLY AND ECONOMICALLY AS POSSIBLE, AND TO TRY TO RESTORE THE INTEGRITY OF GOVERNMENT CONTRACTS, THE NAVY NEEDS MORE EFFECTIVE TOOLS. IN THIS REGARD, I RECOMMEND THAT CONGRESS ENACT LEGISLATION THAT WOULD:

1. PERMIT THE NAVY TO AWARD SHIPBUILDING CONTRACTS TO OTHER THAN THE LOWEST BIDDER IN CASES OF AN APPARENT BUY-IN ATTEMPT, OR WHEN THE SECRETARY DETERMINES THAT AWARD TO OTHER THAN THE LOWEST BIDDER WOULD LIKELY RESULT IN COST SAVINGS TO THE GOVERNMENT. UNREALISTICALLY LOW BIDDING, FOLLOWED BY INFLATED CLAIMS, DESTROYS THE VALUE OF COMPETITIVE BIDDING, WASTES TIME AND EFFORT, AND FRUSTRATES GOVERNMENT EFFORTS TO BUY ECONOMICALLY.

2. ESTABLISH A ONE YEAR STATUTE OF LIMITATIONS ON SUBMISSION OF CLAIMS, AND PROHIBIT PAYMENT OF PUBLIC FUNDS FOR CLAIMS NOT FULLY DOCUMENTED AND SUBMITTED WITHIN THIS PERIOD. THIS WOULD PROVIDE CONTRACTORS AMPLE TIME TO IDENTIFY AND SUBMIT ALL LEGITIMATE CLAIMS, BUT FORECLOSE THE PRESENT PRACTICE OF CONTRACTORS WAITING FOR SEVERAL YEARS TO SEE HOW WELL THEY MAKE OUT ON A GIVEN CONTRACT AND THEN SUBMITTING CLAIMS TO MAKE UP FOR THEIR OVERRUNS.

3. PROHIBIT USE OF PUBLIC FUNDS TO PAY INSURANCE CLAIMS FOR A CONTRACTOR TO CORRECT HIS OWN DEFECTIVE MATERIAL AND

WORKMANSHIP, OR TO PAY INSURANCE PREMIUMS ON POLICIES THAT WOULD COVER THESE RISKS. THE PRECEDENT ELECTRIC BOAT IS TRYING TO ESTABLISH IN THIS AREA WOULD EFFECTIVELY CONVERT FIXED-PRICE CONTRACTS INTO COST-PLUS CONTRACTS.

4. PROHIBIT THE USE OF PUBLIC FUNDS FOR FINANCING CONTRACTORS BEYOND AMOUNTS DETERMINED BY THE NAVY TO BE OWED THE CONTRACTOR. THE PRACTICE OF PAYING CONTRACTORS MONEY THAT IS IN DISPUTE, PENDING OUTCOME OF A CASE, ELIMINATES ANY CONTRACTOR INCENTIVE TO RESOLVE A CONTRACT DISPUTE QUICKLY, AND ON ITS MERITS.

5. REQUIRE THE DEFENSE DEPARTMENT TO STOP FURTHER PAYMENTS ON ALL CONTRACTS WITH ANY CORPORATION DURING ANY PERIOD IN WHICH ANY SEGMENT OF THAT CORPORATION DOES NOT PROCEED IN GOOD FAITH TO PERFORM ANY DEFENSE CONTRACT OR SUBCONTRACT. THE NAVY SHOULD NOT BE LEFT VULNERABLE TO THOSE WHO STOP WORK ON DEFENSE CONTRACTS AS A MEANS TO EVADE THEIR CONTRACT OBLIGATIONS.

6. PROHIBIT THE USE OF PUBLIC FUNDS TO PAY FOR PRICE ADJUSTMENTS MADE TO A CONTRACT AS A RESULT OF A CLAIM ARISING UNDER ANOTHER CONTRACT. THE SO-CALLED CROSS-CONTRACT IMPACT CLAIMS THEORY, IF RECOGNIZED, WOULD PROVIDE A CONTRACTOR WITH A BASIS TO REOPEN THE PRICE OF ANY CONTRACT ANYTIME HE WISHED TO DO SO.

7. REQUIRE THE SECRETARY OF DEFENSE TO CERTIFY, IN SUPPORT OF BUDGET REQUESTS, THAT HE HAS OBTAINED AGREEMENT ON CONTRACT TERMS AND CONDITIONS WITH WEAPONS SUPPLIERS, AND THAT SUCH TERMS AND CONDITIONS PROVIDE APPROPRIATE PROTECTION AGAINST

AFTER-THE-FACT CLAIMS. ONCE CONGRESS APPROPRIATES FUNDS FOR DEFENSE REQUIREMENTS THE GOVERNMENT HAS LITTLE OR NO LEVERAGE WITH ITS CONTRACTORS ON TERMS AND CONDITIONS.

8. PROHIBIT THE PAYMENT OF PUBLIC FUNDS FOR ANY JUDGEMENT OR DECISION BY THE ARMED SERVICES BOARD OF CONTRACT APPEALS ON ANY APPEAL WHICH DIFFERS FROM THE ORIGINAL CLAIM SUBMITTED TO THE CONTRACTING OFFICER. THIS ACTION WOULD STOP THE PRACTICE OF CONSTANTLY REVISING CLAIMS IN ORDER TO FRUSTRATE THE GOVERNMENT'S CLAIMS ANALYSIS AND DEFENSE EFFORTS. THIS WOULD ALSO PREVENT THE PRACTICE BY CONTRACTORS OF PRESENTING TO THE BOARD A DIFFERENT CLAIM THAN THE ONE EVALUATED AND DECIDED BY THE CONTRACTING OFFICER.

9. PROVIDE AUTHORITY FOR THE GOVERNMENT TO RECOUP FOR THE U.S. TAXPAYER EXCESSIVE PROFITS ON DEFENSE CONTRACTS. DESPITE WHAT DEFENSE CONTRACTOR LOBBYISTS AND DEFENSE DEPARTMENT PROCUREMENT OFFICIALS CONTEND, EXISTING PROCUREMENT SAFEGUARDS DO NOT PRECLUDE EXCESSIVE PROFITS ON DEFENSE WORK.

10. PROVIDE AUTHORIZATION AND FUNDING TO RESUME CONSTRUCTION OF NUCLEAR ATTACK SUBMARINES IN A NAVAL SHIPYARD. THE NAVY WILL NEED THE EXTRA CAPACITY AS WELL AS AN ALTERNATIVE SOURCE TO THE TWO PRIVATE YARDS. ALSO, THIS WILL GIVE US A BENCH-MARK TO JUDGE COSTS AT PRIVATE YARDS.

EVEN WITH THE LEGISLATION RECOMMENDED ABOVE, I AM NOT OPTIMISTIC THAT THE DEFENSE DEPARTMENT AND THE COURTS WOULD BE CAPABLE OF DEALING EFFECTIVELY WITH A SHIPBUILDER WHO IS DETERMINED NOT TO HONOR HIS CONTRACT. THIS IS WHY LEGISLATIVE

BODIES SUCH AS YOURS ARE CONSTANTLY IN SESSION ENACTING NEW LEGISLATION TO FIT THE EXIGENCIES OF THE TIME.

PERHAPS THERE IS NO WAY TO ENFORCE SHIPBUILDING CONTRACTS OR TO DISCOURAGE CORPORATIONS FROM ENHANCING THEIR PROFITS THROUGH UNWARRANTED CLAIMS. I RECOMMEND, THEREFORE, THAT THE CONGRESS REQUIRE THE DEPARTMENT OF DEFENSE TO REPORT, WITHIN ONE YEAR, HOW THE DEFENSE DEPARTMENT WOULD PROPOSE TO CONTRACT FOR CONSTRUCTION OF A NAVAL VESSEL ON A BASIS OF THE CONTRACTOR BEING PAID A FLAT MANAGEMENT FEE – A FEE WHICH COULD NOT BE ADJUSTED FOR ANY REASON FOR THE LIFE OF THE CONTRACT.

CONGRESS SHOULD ALSO GIVE SERIOUS CONSIDERATION TO ACQUIRING ESSENTIAL SHIPYARDS SUCH AS ELECTRIC BOAT AND HAVE THEM OPERATED BY A RESPONSIBLE CONTRACTOR AS A GOVERNMENT-OWNED, CONTRACTOR-OPERATED FACILITY. THIS IS THE WAY THE DEPARTMENT OF ENERGY, AND ITS PREDECESSOR THE ATOMIC ENERGY COMMISSION, HAS ALWAYS CONTRACTED EFFECTIVELY AND ECONOMICALLY FOR PRODUCTION OF NUCLEAR WEAPONS.

TABLE I

FEE ON COMPLETED SUBMARINE OVERHAULS

($ MILLIONS)

SHIP	COMPLETED	ORIGINAL CONTRACT TARGET COST	FINAL CONTRACT TARGET COST	FINAL INCURRED COST	FEE	ORIGINAL CONTRACT FEE (%)	FEE ÷ FINAL INCURRED COST (%)
SSBN 622	May 1977	$44.5	$57.7	$48.0	$8.7	9.6	18.1
SSN 661	Oct. 1977	29.7	39.2	30.2	5.9	9.8	19.5
SSN 663	Apr. 1978	32.9	41.0	28.6	6.1	9.8	21.3
SSBN 631	Feb. 1979	45.3	52.8	44.7	7.5	9.7	16.8*
SSN 668	July 1979	33.1	39.3	34.7	5.1	9.8	14.7*
SSN 670	Dec. 1979	34.0	40.3	35.5	5.4	9.8	15.2*
SSBN 636**	Apr. 1981						

* Newport News also received payments on these overhauls for Cost of Facilities Capital. If these payments are considered an additional return to the contractor, the above figures would increase to 18.6% (SSBN 631), 17.0% (SSN 668), and 18.0% (SSN 670).

** Completed 4/24/81. Complete data not yet available.

TABLE II

PROFIT EARNED BY NEWPORT NEWS ON SSN 688 CLASS SUBMARINE POST-SHAKEDOWN AVAILABILITIES (PSA'S)
(THOUSANDS OF DOLLARS)

SUBMARINE	FIXED PRICE	COSTS INCURRED	PROFIT	PROFIT AS % OF COST
688	$ 6,072	$ 5,318	$ 754	14.2
689	6,387	5,815	572	9.8
690	6,726	5,162	1,564	30.3
691	7,210	5,288	1,922	36.3
693	5,153	4,200	953	22.7
694	5,523	4,330	1,193	27.6
695	5,508	5,047	461	9.1
TOTAL	$ 42,579	$ 35,160	$7,419	21.1

AEC.

UNITED STATES
ATOMIC ENERGY COMMISSION
Washington 25, D. C.

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THE BALANCE SHEET ON EDUCATION

The powerful thrust of Sputnik's launching device did more than penetrate outer space. It also pierced the thick armor encasing our complacent faith in America's present and future technological supremacy. It blasted the comfortable conviction that only in an atmosphere of personal independence and political liberty can science and scientists flourish. It shook the belief, long taken for granted, that a high standard of material well being is both the outward manifestation and the necessary basis for technological progress.

It did greatest damage to our trust in the American educational system - up to now almost as sacrosanct as motherhood. Harsh words are being said about its methods no less than about its aims. For rightly, Sputnik has from the first been seen as a triumph of Russian education. Reams of words and figures have filled the newspaper columns in recent weeks, describing Russian education, comparing it with ours, trying to pin point where we

(more)

have failed in the vital educational task of motivating and training the skilled professionals needed by our country while Russia seems to have no trouble turning them out in vast numbers - three times as many engineers as we, for example.

We are asking searching questions about the aims of education in a modern technological society and how our schools can best achieve them. We are finally coming out of our traditional educational isolation and looking at the educational systems of other countries of western civilization in order to compare them with ours. But we are still not ready to do this in a spirit of detachment, as I shall show later. The whole reappraisal has been painful but good for us.

Sputnik may well be the catalyst which brings about drastic and long overdue reforms in utilizing the nation's intellectual capacities. It may thus do in matters of the intellect what Pearl Harbor did in matters industrial and military. Then as now a dramatic occurrence suddenly revealed that we had failed to develop our capacities to their maximum potential. But as we found then that in a national emergency we could take prompt and vigorous action and perform industrial miracles, so I am convinced we can now take similar action and perform educational miracles.

I should like to interject a warning here. Let us not lose our heads and despair of American technological competence as it is today. The real danger lies somewhat in the future and can be averted if we will act. At the moment, I for one am convinced, we have the men and the resources which, if properly directed and given priority, could have put a satellite in orbit ahead of the Russians. This, of course, is no excuse for our mistake in letting Russia win a propaganda victory, damaging to our prestige among the uncommitted nations of the world and, it is to be feared, also among some of our friends.

The Sputnik was aloft first and that is regrettable. It is particularly regrettable that it is apparently not a military weapon but what looks to many people like pure scientific adventure of a kind which appeals to their imagination as no weapons supremacy could. Russia indeed chose shrewdly where to concentrate for a blow to our scientific and technological prestige. It fits nicely into the International Geophysical Year, too. In actual fact, Sputnik is of course of great significance because of its relation to missile weaponry and because of the potential military advantages of outer space control.

The successful Russian satellite program brings out two important facts which we would disregard at our peril: First, it

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demonstrates conclusively that a modern totalitarian state can depress the standard of living of its people to the level of the most backward of countries, while simultaneously raising a limited sector of the economy to a standard as high as, if not higher, than comparable sectors of the economy of the most highly developed country in the world. Theoretically the favored sector could be any one chosen as of greatest national importance by the rulers of a totalitarian state; in practice it will inevitably be the sector which significantly benefits the country's military and political power. *Second*, it proves that a modern despotism can devise an educational system shaped solely in the interest of the state and in complete disregard of the needs of the individual child, and yet induce *all* children to stretch their intellectual capacities to the utmost. These factors are worth examining in more detail.

We are of course familiar with the total power exercised by the self-chosen rulers of modern totalitarian states. And we have known that they could and did manipulate the productive capacity of their countries in a way which puts heavy industry and armaments production far ahead of production of consumer goods. But most of us have felt that in the long run they would be forced to strike a better balance. I believe we must now accept as fact a permanent imbalance, probably of increasing proportion, between the civilian and the politico-military sector of the Russian economy. The very backwardness of the civilian sector, far from hampering progress, is proving an advantage to Russia's rulers.

Unrest in Soviet dominated countries where communism is a foreign importation which brought with it a steep decline in economic well-being of the people and deterioration in their spiritual life, does not mean that similar unrest will necessarily appear in Russia herself. What must not be forgotten is that almost everyone who had enjoyed material well-being under the old Russian regime was killed or driven out. The rest of the people have never known greater material benefits or more political freedom than they are now permitted to enjoy. If anything, they live better. For though they do not perhaps have as much milk or meat as in prerevolutionary days, they now have something which gives greater satisfaction to a people from whom the world of books, of ideas, of music and art had for centuries been withheld. They have a chance at an education - limited and utilitarian as it may be; they have greater opportunities to see a show, a ballet, to hear concert music - even if they must queue up for hours to obtain tickets. Measured against the past, the Russian standard of living is not in itself low enough to cause unrest, and comparison with life in other countries is carefully prevented.

Authoritarian control and the low standard of living make the running of the civilian sector simple and cheap. It

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takes less time, effort and money to issue orders and deaden independent thought by propaganda than to seek consent by marshalling convincing arguments and winning free and open discussions. The cost in time and money of the whole paraphernalia of parliamentary or congressional government is eliminated. Cost of mass media can be kept at a fraction of what is customary in free countries, and the personnel required need be neither as numerous nor as competent.

The entire business complex is missing and in its place there is a weak consumer industries sector which merely has to keep people reasonably warm, adequately fed and provided with a roof over their head. There is no need for attractive stores, for service industries, for advertising. Almost the whole automobile complex is lacking. No chain of garages, auto dealers, service stations etc. All that are needed are trucks and a few cars for the elite. One could go on *ad infinitum*.

Obviously, given similar resources in land and population, the modern totalitarian state can put into the military-political sector many times as much wealth and man power as any democratic country. With the same number of scientists and engineers concentrating on a few projects deemed of greatest national importance, spectacular technological break-throughs can be achieved. Moreover, the meager demands of the civilian economy on irreplaceable mineral and fuel resources prevent rapid deterioration of the resources base such as now threaten all highly developed countries. When all the gasoline has been burnt up by the American family car, Russia will probably still have a good reserve in the ground for her planes and tanks.

All non-totalitarian countries are multiple-purpose societies in which national income as well as national wealth and man power are allocated to different sectors of the economy under the price system of the open market. Even where democracy is but a feeble force, governments are in practice not free to dispose arbitrarily of people and property except in time of war. In our country, as in all countries of western civilization it is the value judgments of the average man which determine how the country's man power and productive capacity are to be utilized. I believe that everywhere the average man makes decisions by judging how they would affect first, himself and his family; second the group with which he is most closely associated - neighborhood, political party, religious, professional or ethnical group; and last the nation as a whole. For some few there is a fourth category - the world.

This order of value is often self-defeating. A man may feel that his personal interest in tax reduction outweighs the importance of good public education; or he may feel that the

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money his firm can save by letting industrial wastes pollute a river outweighs the interest of the community in preserving esthetic values, natural beauty and a pure water supply; or that he has the right to use pressure to increase his income even if this will result in inflation. He may feel that he has a better right to the biggest, heaviest automobile, than the nation has to conserve a dwindling stock of irreplaceable minerals and fuels; he would like the country's foreign policy to favor his parent's country of origin whether this is to the advantage of our country as a whole or not. Often, re-examination of such judgments will show that they have actually done more harm to the narrower interest than would have a decision which puts wider interests first.

In our country, the major share of all our technical effort has gone into spreading ever higher standards of material well-being over ever larger segments of our population. It may well be that too large an effort has gone into the things that make American life pleasant and comfortable and not enough into the things that insure continuous spiritual and material growth as well as military and political victory in any war, hot or cold.

In the long run, the more disturbing fact which emerges from the Russian satellite program is her success in building in record time an educational system which produces exactly the sort of trained men and women her rulers need to achieve technological supremacy day after tomorrow. Russian education is of course deplorably utilitarian and authoritarian. But it has virtually wiped out illiteracy, today estimated to be only 2.5 - 5 per cent - which does not compare badly with our own rate - 3.7 per cent in 1940 and about 2.5 per cent today. Russia has put a larger percentage of her smaller national income into public education than the United States. She has made the rewards of intellectual accomplishment so attractive that her children are working their heads off to keep up with an extraordinarily tough curriculum, often at the cost of their health which is beginning to worry Soviet doctors. Russia has as great a shortage as we in school buildings - she merely doubles up and so gets twice the benefit we do out of each classroom and school laboratory. I feel sure she would use her schools on a three shift basis if this were necessary. Russia has no teacher shortage, no substandard teachers - she has set their scholastic standards very high, given them a heavy work load; but she also honors them and pays them exceedingly well. Russia evidently has no difficulty getting highly intelligent people with solid education in their chosen subjects to work devotedly and without worrying too much about lack of political freedom. This has been a surprise to us - an unpleasant surprise.

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Had we looked at the matter from the point of view of the peasant children earnestly studying in classroom, laboratory and library we would not have been so surprised. The low standard of living and the memory of a past, meager in culture, are assets to the Soviets. It is difficult for us to understand the intense longing for education - any kind of education - of underdeveloped people. This is one bond that unites Russia - no longer under developed but close enough to the immediate backward past - with all the underdeveloped people of the world.

Moreover, it is far easier to awaken in children a sense of personal achievement, of victory, in mastering the intellectual challenge of tough curricula if there are no competing attractions such as those which claim the attention of our more fortunate children: no comfortable homes, playrooms and back yards to play in; no juke boxes or phonograph records; far fewer movies, hardly any distracting radio or TV programs; no senior proms, dating, long telephone conversations, and of course no hot rods. If they could have them, these pleasant things would greatly delight Russia's youngsters and probably cut into their study time; witness their avid interest in American jive and rock'n roll records - to the dismay of the authorities. Russia does have a problem with unruly so-called young hooligans who are - and this is significant - not the children of the poor, but the pampered offspring of Russia's elite. Eventually, there may be more of these disturbing youths, but for the moment they hardly make a dent in the picture of an earnest, well-disciplined, polite and studious school population.

It has surprised us to find that Russia's intellectual elite does highly competent work despite authoritarian control in all, even the highest educational and research institutions. Russia appears to have found a way of allowing superior minds freedom in the field of their special competence while denying them the right of political criticism. It has apparently been possible to develop the critical capacity of superior minds to the high degree needed for scientific work while fettering it in all other fields. There is evidence that the fetters are well hidden, and that discontent with Russian life is largely prevented. This seems to be done by shrewdly catering to the needs of these people both as scientists and as ordinary men and women. They are allowed to let their minds roam undisturbed in quest of knowledge; they are given superb laboratory and research facilities; the best thoughts of foreign scientists are gathered quickly by large staffs of abstracters from scientific magazines and books the world over and presented to any Russian scientist who needs them; honors are heaped on them for superior achievements although they do not as often get their name in the papers as do their colleagues in the free world for this would smack of "personality cult."

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Scientists also have needs of the kind common to all mortals. So Russia gives them attractive living quarters, country houses, vacations, maids, chauffeurs, cars. Their pay is in the top income bracket; in fact the highest salary in Russia is paid to the president of the Soviet Academy of Sciences. Why should these men concern themselves about the lack of political freedom or the grim and dreary life of most of their compatriots. They probably reason that these are temporary abuses and that their own scientific work will contribute to the wealth and power of their country and thus ultimately to a better life for everyone. Quite possibly, too, totalitarian states may have a built-in incentive for attracting gifted minds to science: the desire to escape to a safe and comfortable ivory tower.

It is an unfortunate accident of history for us that today the military and political power of a country depends so largely on having a highly developed technical civilization. This in turn calls for vast numbers of scientists and engineers. The subjects which these men must master are mathematics, physics, chemistry, astronomy - all apparently regarded as politically safe by Russia's rulers. It is difficult to see how even the most fanatic Marxist could interject the party line into these sciences. It is different, however, with other sciences. Take biology: this is a science which heretofore could not be freely pursued. Scientific truth had to be sacrificed to the Lysenko-Stalin theory of genetics. Other than party line limitations may also restrict free scientific inquiry: for example, Russia does not presently consider it necessary to excel in medical research. Chemists are therefore diverted from inquiries which might cure diseases of man to inquiries which can improve metals. The results of costly foreign medical research are instantly available to Russia so she can shift appropriations from the medical to the engineering faculty and save money and man power.

Enough has been said to give an inkling of the methods by which the Soviet manipulates its skilled man power. It might be noted in passing that the fields in which they have done outstanding work have been precisely those where they allowed maximum intellectual freedom. Little that is new and original has come out of Russia in other fields. But second-rate theatre, literature, art, etc. are not of great importance in today's international power relationships.

Faced with this formidable and ruthless adversary who has openly promised "to bury" us and who grows daily in industrial and military might - what are we to do?

First, I think, we must awaken America to the danger facing the nation - making public all the facts, and without soothing the impact of unpleasant truths. I have no doubt that as a people we have enough patriotism, let alone enlightened self-interest, to recognize that we must put greater effort into the things which will make America strong, even if this may require a reappraisal of cherished convictions and ways of life; even some material sacrifices, which I doubt would be large.

Ours is an enormously productive economy - the first in history which produces a large surplus over and above reasonable necessities of life. The flood of goods coming off our production lines is so tremendous that some ten billion dollars must be spent annually to encourage disposal of them. I speak of course of advertising which costs us as much as all of our primary and secondary public schools put together. This is money with which advertisers finance our mass media and through them ceaselessly hammer at the need for ever more and better goods and services. People must be made to buy things for which they feel no need; they must be induced to replace possessions still entirely satisfactory for new ones which, it is promised, will make them up-to-date and keep up the family's prestige. Their subconscious is probed in order to find ways to stifle the still voice of conscience and induce the American people to go into consumer debts of over three billion dollars annually - 42 billion standing on the books as of now. Often young children are conditioned to act as unpaid boosters for higher consumption.

The automobile industry alone must spend one and a half billion dollars each year to design and bring out new models in order to insure that American families keep spending ten per cent of their income on cars. This one and a half billion dollars is about 3/4 of what the nation spends on all its public colleges and universities. I mention these figures to show that sacrifices to give America strength in the race with Russia would be insignificant in view of our enormous margin of luxury spending.

Second, and equally important I believe, we must reverse our treatment of the scientist and trained professional. It is easy to make a good living in this country without much serious education. Hence the temptation to do this is so great it can only be offset by deliberate actions to elevate the status of the trained professional in terms both of prestige and of material reward. We had better stop calling scientists long-hairs, egg-heads, little men with beards. In the present mood of chastisement, scientists have been speaking up and telling us that such disparaging remarks hurt and may discourage many a young man from choosing the hard intellectual road to science rather than the easy and pleasant road to business success and country club living.

But merely spending a lot of money on scientists, scientific research and new military projects will not be enough.

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In final analysis trained man power can only come out of a thoroughly reorganized educational system with totally different aims and considerably higher scholastic standards. To carry through such drastic reforms is a formidable undertaking but reforms of similar magnitude have been carried out elsewhere in the past.

Much could be learned from Europe's experience in education, in particular, for Europe is old and wise at educating the young. Some of her famous universities have been in the business for a longer time than the white man has been in North America. Formal education itself is a European invention and probably the main factor in her phenomenal success, first in colonizing the world and then, so-to-speak, setting it on its feet, with the mark of European civilization so deeply imbedded that it may well prove ineradicable. Nowhere else has there been a spontaneous, native growth; wherever institutional education exists today, it was brought by European settlers or colonial administrators.

One thing we in this country might learn from Europe is how to keep education in step with time. This has necessitated occasional overhauls which we might study to our profit. Let me give you a couple of examples:

We all know that the early 1800s were a time of stress. The French Revolution and the Napoleonic wars had shaken Europe to its foundations. New ideas were in the air and man was about to make a giant leap upwards in his age-old effort to conquer nature. The industrial revolution was giving him new tools, but to use them properly he had to reach a higher plateau of knowledge. Europe's ancient and venerable educational institutions could not give him this knowledge. Therefore they had to be upgraded for their new responsibilities.

Despite differences in political organization among its several independent states, Europe's need everywhere was the same: workers who could read, write and do figures; leaders who were sufficiently educated to manage an industrial society - always more difficult to run than an agricultural or handicraft society. To meet these needs, Europe made elementary education free and compulsory and - on the continent - developed public secondary and university education of high scholastic quality. Heretofore, education had been the province of the church and to wrest it from her was no easy task. The dispute over who was to run the schools was so bitter in Britain, for example, that it delayed establishment of public secondary and university education a hundred years.

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What education there was when the various governments took over suffered from absence of uniform academic standards of curricula and poorly trained teachers. When the state took on support of education, reform began by raising teachers to the status of professionals; this meant that thorough study of subject matter was made compulsory before a person was allowed to teach. The length of such study depended on the subject matter the teacher intended to teach; in the upper levels of secondary education this amounted to a full university course of from three to four years' duration. Greater professional competence was rewarded with higher salaries, and teaching positions were generally competitive. University professors received very considerable stipends.

Europe's universities are solidly anchored in a common past going back to Greece, Rome and the medieval unity of Church and Empire. It had always been the custom for European students to go wherever they could find the best professor in their special field of interest, even when this meant crossing national boundaries. A semester taken abroad counted as much towards the winning of a degree as one taken at home. To preserve this valuable educational mobility, the several countries of necessity had to maintain uniformly high standards for the traditional secondary-school-leaving certificate - known in France as baccalauréat, in Germany as Abitur. This certificate attests that the student has successfully completed his general education and may therefore be admitted to the university. A country which allowed this certificate to fall below standard would lose prestige and bar study at foreign universities to its students.

The quality of the secondary-school-leaving certificate seems to have been worked out independently by France and Prussia in the early 1800s. At first all secondary schools gave a strictly classical education. When Europe found that modern industrial nations needed fewer classical scholars and more people whose education had stressed mathematics, science and modern languages, new secondary schools were established. These were either semi-classical or mathematics-science schools.

Though different subjects are taught in these three basic kinds of secondary schools, the quality of the instruction is identical, as is the rigor of the final examination. All school-leaving certificates are therefore qualitatively the same, though they represent different kinds of knowledge.

European education has always been realistic in its appraisal of the educability of children. It could approach the matter objectively since educational democracy was an unheard-of thing at the time the system was hammered out. It was therefore relatively easy to grasp the diversity of the human mind and to

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make provision for different types of schooling adjusted to necessarily different intellectual needs. Since elementary schools were free, while secondary schools and universities charged modest fees, European education reflected Europe's class structure, though probably never as rigidly as its critics believed.

The coming of political democracy in Europe brought with it a demand that education be opened to all children; in consequence school fees have now either been abolished or adjusted to family income. In fact, it costs less to become a professional in Europe than in this country since her universities charge very moderate fees. If fewer students remain at school in their late teens, this reflects not school policy but simply the fact that Europe is not as wealthy as we are.

Europe's most important educational achievement is that despite pressures not unlike those exerted on the schools here, she has limited democratization of the educational process to the reduction or abolition of school fees and has refused to be stampeded into lowering the quality of secondary and university education; this remains, as it has for a hundred and fifty years, the highest in the world.

European schools are neither social clubs nor finishing schools. Their objectives are limited and clearly defined: they seek to equip the child with all the intellectual tools he can handle; they nourish his mind with as much general culture as he can absorb; and they give his body all the exercise it can take. When a point is reached where pupils can absorb no more mental food, they quit school and go on to institutions which give vocational training of one kind or another.

A century later than the rest of Europe, Russia was in a similar predicament; her schools too were unable to educate children for life in a modern industrialized country. The Soviet had inherited from Czarist Russia an educational system closely patterned after that of Continental Europe. Qualitatively it was not much below European standards but quantitatively it was totally inadequate. Russia was 60-70 per cent illiterate at the outbreak of World War I, but liberal influences had begun to permeate the country and education was being rapidly extended. Perhaps 50 per cent of Russian children were in elementary and seven per cent in secondary schools. Scientific work of high quality was being done at Russian universities. Had Russian education not been disturbed it would undoubtedly have caught up with that of the rest of Europe in a reasonable length of time.

Once they seized power, the Soviets promptly took control of all schools - public and private - and replaced them with a unified, nine-year labor school which was to be compulsory and open to all children. Since available facilities were woefully

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limited, admission to school was determined by the political rather than the intellectual worth of the child. Into the schoolrooms and academic halls poured the sons of the proletariat. In fact,for many years bourgeois origin was an absolute bar to education; this was in line with Marxist dogma that schools are tools of the government by means of which those in power perpetuate their control of the state. Protests by teachers that indiscriminate admission of vast masses of children would lower scholastic standards were dismissed as irrelevant. Already suspect by reason of their professional status, the teachers' views on education were brushed aside as bourgeois heresy.

While famine, civil war and economic collapse forced closing of one school after another, a vigorous debate over the future form of Soviet education went on. In the light of today's monolithic authoritarianism it is strange to read of the wide range of experimentation which took place in Russian schools during the nineteen-twenties. There were advocates of progressive education. There were others who wanted the schools to be replaced by "learning through life itself". For a time it was believed that children ought not to be taught definitive subjects but should be put to work on vague "projects"; classes were divided into groups of children who compete with each other to complete these projects. There were also extremists who felt that in a socialist school the teacher ought to be a member of the class and have no more authority than the children; everything was to be done in a cooperative way.

Despite the leeway given to experiments in methods of teaching, Marxist dogma on education was of course paramount. Education had to be free and the same for all children. The purpose of education was to produce Soviet Man; hence the primary duty of the teacher was to mold children into loyal members of a socialist society. Political orientation was more important than presentation of factual truth.

Meanwhile the experienced teachers left over from the old regime were rapidly replaced by unqualified but politically reliable Soviet teachers. Curricula were revised each year. Textbooks had to be continually rewritten to conform with political requirements. Young Komsomols and party inspectors broke into classrooms at frequent intervals to check on the political orthodoxy of subject presentation. Teachers were ill paid and overburdened.

This hasty and ill-considered tampering with education went on for fifteen years before the disastrous results became evident to Russia's rulers. The universities and other institutions of higher learning began to complain that the schools sent them students who could not deal with fractions or solve second degree equations; who had never heard of Newton's binomial

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theorem; who knew next to nothing of geography and history and because of ignorance of foreign languages could not understand scientific terminology. The whole matter came to a head when it was discovered that the five-year plans would remain blueprints unless Russia's schools provided well trained professionals and skilled workers to carry them into effect.

The Soviets thus came up against their first unsurmoutable obstacle; one which could not be liquidated by propaganda or by force. Either Marxist dogma had to be given up or the plan to transform Russia into a modern industrial state must be relinquished. It was as simple as that. Faced with this dilemma, which must have been painful indeed, Russia's leaders sacrificed dogma and did a complete about-face. They abolished the comprehensive labor school and reinstated prewar curricula and teaching methods.

Because of this ability to face facts squarely Russian education for the past two decades has in reality been European education, but with all its classical, philosophical, nontechnical parts left out and with a heavy overlay of Marxist indoctrination. It is a sort of utility model from which everything considered nonessential by the Soviets has been stripped. In particular, the broad general culture and the independence of judgment which European schools give their pupils has been omitted. Freedom of the mind is allowed only where the subject matter makes this indispensable. Schooling is not a right of the child but a privilege which must be won each day by proving competence. Examinations quickly weed out the stupid or lazy child and he is forced out of the schoolroom and into the factory or the army.

In Russia there is only one basic school preceding higher education - the ten year school. The curriculum is identica in the same grade in every school throughout the country. Students are permitted to advance only so long as they can master the curriculum. Various types of vocational schools are open to those children who desire to or who must leave after completion of the fourth grade or the seventh grade. Children are thus under great pressure to study hard, since completion of the ten year school exempts them from military service and, of course, opens the higher professions to them, provided they can get past the examination hurdle which bars from the universities all but 30 per cent of the ten year school graduates.

By stripping down to what the Soviets consider the essentials, secondary schooling can be completed in ten years instead of the usual 12-13 years in the rest of Europe. These two years saved enable the Russian student to being training for his profession at 17. No effort is stinted to give him the best grounding in the subjects he needs, especially for study of

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science and engineering. The university courses in this field are of highest caliber; we can see today the results of all this effort in Sputniks, hydrogen bombs, and other similar achievements.

If we discuss education with a clear understanding of the distinction one must make between the methods used to impart knowledge, and the purposes for which each society educates its young, then it is easier to rid oneself of emotional bias against the methods simply because one abhors the purposes. We can then learn something from Russian education. What we can learn, I think, is that we made a grave mistake when we disregarded Europe's experience in educating the young, just because many of us have had strong emotions about authoritarianism in European schools and their rigid multiple-track system. We continue to reject 19th century European education and we refuse to look at its 20th century offspring which is far less authoritarian, far more flexible, and far more open to the gifted of all classes than most of us realize.

Russia has been more realistic than we in education, and less dominated by political dogma, strange as this may sound. She was able to use the European educational system because she could readily see that methods of teaching a subject like French or physics were basically nonpolitical; hence it was wise to copy the best methods, no matter who had devised them.

That Russia has been enormously successful in what she set out to do when she reorganized her educational system, is now plain to all of us. In the fields where she wants to excel, her education is certainly of the best. In other fields this seems doubtful. But a nation survives today more by reason of having excellent scientists and engineers than good doctors and lawyers. I have ventured to do a little figuring and by comparing population with attendance at universities, I have come to the conclusion that Russia, in proportion to population, is now training twice as many professionals as we. In addition she has thirty million more people and her population percentage in the age group under twenty-five is considerably greater than ours.

If these figures are correct, and we have no reason to doubt them, the meaning is obvious. In just over twenty years she has succeeded not only in reforming a school system, all but in ruins, but in carrying to adequate academic levels so large a proportion of her school children that she can enroll twice as large a proportion in her universities as any of the western nations.

It is interesting that the proportion of university students in Europe is about the same as in America, just as the

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proportion of national income devoted to education is about the same. Most European countries put 2-1/2 to 3-1/2 per cent of their national income into education. The United States invests in public education just over 3-1/2 per cent, but if all of private education is added, the percentage rises another point. The proportion of youth studying professionally in institutions of university rank is about 5-6 per cent here as it is in western Europe. What then are we to think of Russia where 8-12 per cent of her youth are studying professionally in universities? Does it not reflect the fact that she spends over six per cent of her national income on education? When a country with a much lower living standard than ours spends a greater percentage of her income on education, it is time we paused and reflected.

The rate of progress or decline of a country is so closely tied to the education it gives its children that one might call this rate a function of education. A wise country knows that the best investment for the future is the money put into schools. Every country educates its people, whether informally by the father's advice and example as in primitive agricultural and handicraft societies, or formally in schools as in modern countries. At different stages of history, different kinds of education are needed. Life does not stand still; neither can a nation. It either advances or it retreats and it will retreat if it tries to stand still. For these reasons education must continuously be kept under close scrutiny to insure that it will always produce the kind of people needed at any given moment in time.

It should be evident to everyone that our schools do not motivate and educate enough youngsters to become professionals and that the resultant shortage in trained man power is a warning signal which we must not disregard. As a people we have been caught napping. The Scientific Revolution is upon us and we have not prepared to meet its ever-spiralling demands. Our attitudes toward education are often uncritical holdovers from the past, having no validity today. The launching of the Sputnik was a providential warning; we will disregard this warning at our peril.

There was a time long ago when our country needed hardy pioneers to conquer a continent rather than educated men; our anti-intellectualism which colors so much of our thinking about education has its roots in this pioneer past. At another time our greatest need was to assimilate the avalanche of immigrants pouring into the country; American emphasis on nonacademic school objectives, notably on teaching children manners and social graces, the efforts we make to maintain a uniform level of behavior and accomplishment - all the essentially extracurricular burdens we put on our schools go back to a time when the school was our best instrument for Americanizing millions of foreigners as rapidly as possible.

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For a long time the welfare of the country has been intimately tied up with its industrial growth, and so the businessman's outlook was predominant; this accounts for a certain inclination to judge education by its dollars and cents value, its immediate usefulness. This probably has had something to do with our tendency to equate teaching the tricks of a trade with cultivation of the powers of the intellect.

We now have a proliferation of educational institutions but with no national standard of academic excellence. The elementary and secondary public schools are controlled and largely financed on the local level and any kind of outside influence has always been stoutly resisted; even state control is tolerated with ill grace. There is therefore no national standard for the high school diploma. It is granted for educational efforts so dissimilar as to be valueless in judging a graduate's competence.

Equal diversity prevails among our colleges and universities. Some hardly deserve to be rated as secondary schools, while others are excellent; among the best in the world. The B.A., M.A. and PhD degrees which they award are as dissimilar in value as are the diplomas of our high schools.

Only the professional degrees - those given to lawyers, doctors, engineers, and so on - maintain a fairly uniform standard - and it is good. The reason for this unexpected respect for excellence in professional degrees is usually to be found in some form of outside pressure, such as the need to meet state qualifications for licenses to practice the profession.

Because of the uninhibited way in which institutions of widely divergent academic standing award diplomas and degrees, it has always been difficult to judge American education by comparing it with that of countries having a similar civilization. Throughout the world, the American degree has no assured standing but is judged solely by the reputation of the institution which awards it. This makes it difficult to evaluate the B.A., especially, since nothing exactly like it exists in Europe.

The greatest confusion in any comparative study of education comes from the misconception of the worth of the American high school. We have always overvalued it. Merely because its graduates are approximately of the same age as European graduates of secondary schools, we keep thinking of the two as being, if not identical, at any rate comparable. This would only be true if you equate possession of social poise, good citizenship and pleasant disposition with solid academic knowledge such as even few colleges in the United States impart in a four year course.

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In recent comparisons of American and Russian education we have, for example, compared the number of graduates of the Russian ten-year schools with those of American high schools and found the result not too disheartening. Similarly, we lump together United States college and university enrollment - only 11 per cent of which is postgraduate - and compare it with enrollment in Russian universities and professional schools; again, though not good, the figures are not actually frightening. We carefully count the hours our children spend in elementary and high school and find that in twelve years they've sat in class about the same length of time as the Russians in ten years. We then say sadly that the Russians do seem to get more sciences than our children and that something should be done about it.

We follow the same procedure when we make comparisons with European schools. It comes out that we have many more children in high school and in college than they have in secondary schools and universities, and this makes us proud. But all of these comparisons are meaningless because the European secondary school graduate has learned more than most of our college graduates; and as to the high school diploma, the less said about it the better.

How can you make a meaningful comparison between the American high school and the Russian ten-year school or the European secondary school? The latter two can be compared with each other and the Russian comes out the worse, though not in things which his government considers essential. But one cannot compare the number of hours spent in our high schools with those spent in any European or Russian secondary school, for even the hours are not qualitatively the same. There an hour at school means an hour of uninterrupted serious work; here there are assemblies, errands to be run, special assignments (like collecting milk bottles for lunch), and the teacher must spend a great deal of time helping the dullards who would so much rather be on the outside earning money than trying to study "language arts". It takes almost a week to get work started at the beginning of each semester and another week to tidy up at the end. Then there are trips to survey various adult activities, checking on the fire department or the bakery, and much time goes into preparing for the school play.

It isn't even possible to compare one hour of French or physics in the average American high school with one hour of these subjects in a European or Russian secondary school and for this reason: over there they have a continuous program of instruction which advances from the moment the subject is first introduced. As the child grows in understanding, the presentation of the subject by the teacher becomes broader and deeper, more information is added and more facts are discussed until in the end

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the pupil masters the subject thoroughly and it is his for life. In such a well-planned program each hour carries the pupil's knowledge a step forward. But we, in this country, in a mistaken idea that the child should exercise free choice, give him much leeway to pick and choose among a large number of subjects. He may take French in the ninth grade, drop it for two years and take it up again in the eleventh. Meanwhile he will have forgotten most of what he learned and time will be wasted reviewing in the second year what he was supposed to have learned in the first year.

A point is reached where quantitative diversity becomes so great that comparisons are meaningless. The Russian ten-year school, for example, gives each and every student 1,353 hours of classroom and laboratory instruction in the sciences. Many of our high schools teach no science at all; only 1/3 of our high school graduates have even studied science, and the maximum obtainable, with a few exceptions is 756 hours.

Take foreign languages: every pupil in a European science-mathematics secondary school has nine years of one foreign language and six years of another. Yet many of our high schools teach no foreign languages at all, and there are few graduates who have had as much as three years of even one foreign language.

Some American high school graduates never get beyond quadratic equations but every graduate of the European science-mathematics secondary school must be familiar with differential and integral calculus, analytical geometry, application of mathematics to physics, and spherical trigonometry.

It is time we face up to the fact that few American students at age 21-22 know as much after a four-year college course as most European secondary school graduates know at age 18-19.

There is much dissatisfaction with our schools today. Parents feel vaguely that the local high school is below par but they have no way of proving it. In some fashion, we must devise a way to introduce uniform standards into American education. Since there is widespread distrust of the federal government in matters educational, and education is under our constitution within the province of the states, it would be best to set up a private agency; a Council of Scholars, financed by our colleges and universities as a joint undertaking; or perhaps by Foundations. This Council would set a national standard for the high school diploma, as well as for the scholastic competence of teachers. High schools accepting this standard would receive official accreditation, somewhat on the order of the accreditation given medical schools and hospitals. Teachers would receive a special

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certificate if they completed the requisite course of studies.

Community pride would be a potent factor in inducing high schools to obtain accreditation. For the first time parents would have a real yardstick to measure their schools. If the local school continued to teach such pleasant subjects as "Life Adjustment" and "How to know when you are really in love", instead of trigonometry, French and physics, its diploma, for all the world to see would be inferior. Taxpayers will begin to wonder whether they are getting their money's worth when they see other schools receiving accreditation, and when their children find admission to college difficult because theirs is an inferior diploma.

Schools would soon discover that to obtain the coveted accreditation they would have to have teachers with a thorough knowledge of their subjects.

This would put pressure on educators and state authorities to bring their teacher certification requirements into line with today's need for teachers thoroughly grounded in the subjects they teach. Another most desirable effect would be the enviable position in which Council-certified teachers would soon find themselves. There would be lively bidding for their services with the near-automatic result that their salaries and prestige would rise. More intelligent people would then be drawn into teaching, thus starting an upward spiral and giving teachers at last the true status of professionals which they most surely deserve.

As part of what I feel must be a concentrated effort to introduce quality education into the high schools, I again urge that industry, labor, and the Foundations endow some twenty-five model high schools which would be open to all children but only upon passing rigid entrance examinations.

Once scholastic standards are firmly set, the Council should concern itself with a plan to shorten American general education to at most 14 years; and to 12-13 years for brilliant children. It ought to work out a plan for all high schools to graduate at age 16 those children who are able to learn fast and who plan to become professionals; colleges would probably accept the 16 year olds if they came with a Council-accredited diploma.

Within the next fifteen years, six million youngsters will clamor for admission to our institutions of higher learning. Colleges and universities are now being exhorted to prepare for the flood and they are severely criticized when they refuse to expand in order to become mammoth high schools where overgrown children must be taught to spell or write a simple essay; where hardly anyone really knows a foreign language, and many are

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mathematically illiterate yet confidently expect to become engineers because this is a profession where much money is to be made.

We are in our present predicament because education in America has deteriorated in quality for lack of standards. You can send your boy to college to study Fly-casting or Advertising layouts; your daughter to study Etiquette and How to be a Hostess. After twelve years in elementary and high school; four years at college, and three years of postgraduate study, the crowning achievement may be a PhD thesis on "A Study of School Postures and Desk Dimensions". It matters not whether you take courses in calculus, medieval history, women's styles or interior decorating. Everything is grist to the American educational mill. "You, too, can have a degree." Every American child has the God-given right to march in a commencement procession, clad in mortarboard and academic gown, the rolled up parchment degree clutched in his hot little hand. What for centuries was a solemn moment crowning long years of arduous mental discipline and hard work, has now begun to mark the end of high school and may some day reach our little sixth-grade scholars.

Let not men of little vision with their soothing words hold back our righteous anger. We must sweep clean the temple of learning and bring back quality. For, as President Sproul of the University of California, warns us: "If we fail in our hold upon quality, the cherished American dream of universal education will degenerate into a nightmare."

Let us each make a beginning, however small. It takes but the moving of a single pebble to start an avalanche.

THIS SPEECH REFLECTS THE VIEWS OF
THE AUTHOR AND DOES NOT NECESSARILY
REFLECT THE VIEWS OF THE SECRETARY OF
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THE ROLE OF THE CRITIC

I am pleased to be here today since this year's meeting of the Edison Foundation coincides with the end of my first decade of involvement in American education. It is an honor to inaugurate my second decade by addressing this distinguished audience. May I put in a petition to the Foundation for a place on its agenda ten and twenty years from now, God willing?

You may think me unduly pessimistic. Why should I expect that twenty years hence it will still be necessary to advocate reform of our schools? Are not the American people beginning to see that such reforms are essential if we are to survive as a free nation? However, if there is anything I have learned in the last ten years, it is the overwhelming power of resistance to reform possessed by organized groups with a vested interest in the status quo. Educational officialdom is such a group. It has been so successful in resisting needed reforms that we

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are today in grave danger of being overtaken in science and technology by a nation with a more efficient and rigorous educational system.

Hardly a week goes by without some news item showing Russia moving ahead in scientific knowledge or technology. A leading American mathematician reports the Soviet Union ahead of the United States by ten to fifteen years in the complicated area of accurate rocket control mechanisms--the reason being Russian leadership in the field of non-linear differential mathematics. Three United States senators return, warning us that the Soviet Union is assuming world leadership in the development of hydroelectric power. A professor of Industrial Management and Engineering discloses Russia's ability to outproduce the West in certain machine tools. These are but a few items appearing in a recent ten-day period.

Official statistics show that in 1957 Russia had a ten-percent lead in scientific and technical manpower over the United States. The Soviet force, moreover, included 30% more holders of advanced degrees. Because of faster growth rates, official estimates expect the Russians will have a 25% lead in trained manpower by 1961, with an even greater advantage in holders of advanced degrees. Space experts now concede that we are five years behind the Russians.

Yet many American educationists do not appear to see the connection between these scientific advances and the quality of Russian education. Not long ago one of them complained that it had never been "demonstrated in any way resembling a scientific procedure of thought" that Sputnik reflected a triumph of Russian education! Another urges us not to worry about keeping up with the Russians; "let's keep up with the children." Still another ridicules those among us who are concerned over Russia's more efficient education and makes the wholly unsubstantiated--and, truth to tell, somewhat ridiculous--claim that the Russians are "worrying themselves sick about us."

One can understand educationist annoyance when Russian achievements are used to show up the mediocrity of our schools. But I am shocked and worried when I see them carelessly misleading the American public on what actually goes on in Russian education. For example, there is the wholly untrue assertion constantly being made by them that Russian schools teach only science and neglect the humanities, while ours are said to give a more rounded education. The fact is that Russian schools devote about as much time to the humanities as to the sciences and mathematics, and a great deal more to both than do our schools. Again, I constantly come upon assertions that only a tiny fraction, a small percentage, of Russia's children graduate from the ten-year schools while more than 80% of our children go to high school. In the first place, only 55-58% of our 5th graders graduate, as can be seen if one takes the trouble to consult the United States Statistical Abstract. Figures published by the United States Office of Education show that in 1957 1.6 million Russians graduated from their ten-year school, about 10% more than the number of Americans graduating from high school that year. In evaluating these figures we must keep in mind that while Russia has about 16% more people than we, World War II losses have probably brought her school-age population close to ours. In other words, she graduates about the same percentage from her rigorous ten-year schools as we from our easy high schools. Furthermore, Russia has not yet completed her present program of covering the land with ten-year schools; she is likely to graduate even more children some years hence.

I find such carelessness with statistics unforgivable. Not only is it untrue that only a small percentage of Russian children get a ten-year school education; the education they do get is far better than our children get after twelve years of schooling. This is obvious if one consults the examinations passed by all of these 1.6 million young Russians. These cover an amount of knowledge in mathematics, physics, chemistry, history, literature, the mother tongue, and at least one foreign language, which will rarely be possessed by young Americans unless they have completed two years of a good liberal arts college. Several times more young Russians have learned this by age 17 than young Americans by age 20. These examinations have been translated and published by the United States Office of Education and were therefore available to everyone. They have now also been included in a report of my testimony on Russian education before the Appropriations Committee of the House of Representatives which will be sent free of charge to anyone who writes to the Committee. I suggest American parents use these examinations as a yardstick by which to measure the achievements of their local schools.

I hope they will not allow themselves to be fooled by the specious argument often made by educationists that what goes on in Russian schools has no relevance for us since Russia educates her children in order that they may be useful to the state, while we do so in order that our children may have the personal advantages a good education provides. The objective in both cases is to impart knowledge in the humanities, in mathematics and the sciences to a child growing into adulthood and, in the process, to develop his mental capacities. What is relevant for us is that Russia gets a larger percentage of her children through a rigorous course of higher secondary education than any other country, especially our own. She also gets more students to become first-rate scientists and engineers than we are able to do. Therefore she has a larger pool of trained professionals and is able to forge ahead of us in important areas affecting national strength and power. This is what is meant when one speaks of the Russian educational menace.

I hope parents will not allow themselves to be fooled by educationist misrepresentation of what critics advocate when they point to Russian educational achievements. Neither I nor other critics have ever recommended that we take over the Russian educational system; we do urge that we consider Russian educational achievements as a minimum standard for our own educational objectives. We warn that it would be suicidal if we allowed scholastic levels in our schools permanently to drop below this minimum standard. We flatly reject educationist claims that since ours is mass education it must therefore be mediocre, or that democratic education can never be as good as education in an authoritarian society.

It is an old progressive gimmick to propound an antithesis between democratic and good education, as if the two were mutually incompatible. Not only is it used today to deprecate Russian educational achievement; it has always been the alibi of our educationists when one confronts them with the unquestioned superiority of European educational accomplishments. Of late, however, the critics have been bringing in evidence to prove how phony is this alleged incompatibility of excellence with equal educational opportunities. We now have ample data showing that from the first day the European child goes to school, he forges scholastically ahead of ours.

Recently the Council for Basic Education published a book by Charles H. Schutter and Richard L. Spreckelmeyer, entitled Teaching the Third R. In it arithmetic textbooks here and abroad are compared in great detail. In view of the frequent accusation made by educationists that children abroad learn by rote, it is interesting to observe how much emphasis is placed in European schools on developing a "figure sense" in children by teaching them mental shortcuts to problems. In contrast, rote learning is quite prevalent in our own schools and there is also far more emphasis on memorizing formulae instead of reasoning out ways to solve arithmetical problems. Tables show at what age children reach given levels of arithmetical knowledge. From Ireland to Poland, from Sweden to Italy, in England, France, Germany, Holland, Denmark--throughout Europe in fact--children move ahead so much faster that by the sixth year they are almost two years further along than our own children. This is true not only in arithmetic but in the other two "R's" as well. Rarely does a European child complete his formal education without being able to write legibly and correctly but many of our college freshmen have to take remedial courses in this simple skill. Nor do normal European children fail to learn to read with ease before they enter their early teens.

Mind you, I am speaking of comparative achievement levels in elementary schools here and abroad. These are free public schools attended by children before they are separated by ability into different secondary schools. Thus for elementary schooling, the stock argument of American educationists that European education is good because it is class education and ours must necessarily be inferior because it is mass education will simply not stand up.

In their homogeneous secondary schools, Europeans continue to gai over our children. The abler children who attend higher secondary schools, in particular, advance much faster than children who take college-preparatory courses in high school here. Abroad a liberal education comparing favorably with what Americans acquire in sixteen years of school and college takes but twelve years--in a very few countries thirteen. Europeans are therefore four years ahead of Americans when they begin their professional education at a university; for most top-level professions here, a Bachelor of Art's degree is a prerequisite before one is admitted to professional school. I find it personally humilitating that most European universities also demand a Bachelor of Art's degree of Americans wishing to matriculate, while they admit all Europeans with a "maturity" certificate, obtained at the end of the higher secondary school.

For some time, I have been collecting "maturity" examinations from various European countries which I hope some day to translate and publish. The amount of knowledge in the humanities, in mathematics, and in the sciences required to pass these exams will rarely be possessed by American students unless they have taken a four-year liberal arts course at college. At that, few of them could pass the foreign language test of the European maturity examination. There the studnet must show he can write an essay--without using a dictionary--in at least two, more often three, foreign languages. I have before me several such essays and I find them deeply disturbing. In spelling, grammar, style and composition, these essays could rarely be equalled by our best high school graduates *in their own mother tongue*. Few PhD candidates here could match them unless they had specialized in foreign languages. Yet American educationists constantly equate the high school diploma obtained for a college-preparatory course with the European maturity certificate. This gives our people a wholly false idea of where we stand educationally.

If we compare them with Russian ten-year school graduates, Europeans who have passed a "maturity" examination are about two years ahead of the Russians as far as basic knowledge is concerned. Their schooling also has developed in them considerable ability to think independently and it has given them a much broader cultural background. While I feel that we should consider Russian educational achievements as minimums below which our schools must not be allowed to fall, I believe we ought to strive beyond this for the goal of matching European levels at least for those of our children who will go on into the professions. As it is, many of them are barred from becoming professionals here because of the length of time it takes and the high cost. In consequence, we have a chronic shortage of professional people.

It is important that we not let ourselves be fooled into believing that our schools are unique because they charge no tuition; this was true before World War I, but since then one European country after another has made all schooling up to age 18 tuition free or subject to such minimal charges that no really talented child is barred from school because of poverty. Moreover, European universities are far less expensive than ours so that in professional education the European student does not face the financial barriers our students encounter.

Misconceptions about European education are slowly disappearing as a result of information made available by the critics of American education. We are beginning to realize that ours was not the first nation to establish public education or that it alone opens the educational door to the very top for all children. But we still seem bemused by educationist claims that it is "undemocratic" for other Western nations to separate their children after elementary school, and to put them into different types of secondary schools according to their mental abilities and vocational aims. We still hold the comprehensive school sacrosanct and consider it the only truly "democratic" school.

I find it difficult to understand why we think it "undemocratic" to have children attend separate schools, each appropriate to their abilities and aims, as long as these schools are open to all free of charge. We do not say it is "undemocratic" that nurses go to nursing school and doctors to medical school, and that each obtains a different diploma. Nor do we send enlisted personnel to the same school as officers. Why do we get angry at Europeans for weeding out the dullards from the talented children and sending them to separate secondary schools? What good would it do the dullards to be admitted to a school where they would just sit around understanding nothing? What does it benefit them to be given diplomas which stand for nothing but a given number of hours spent sitting at a school desk? Are the less able children harmed when the abler children are allowed to pass more rapidly through the elementary stages of education and into the higher ones? What is democratic about penalizing God-given talent by letting it go to waste so average children won't feel a sense of inferiority?

It may be beguiling in theory to think of all our children going to school together. But will it really serve their best interests to send them to schools where not only the children of the poor mingle with those of the rich, which is, of course, what I consider highly desirable and strongly advocate, but where the child with IQ 70 sits beside one with IQ 170, and where the morally weak child freely associates with the child who has been carefully raised to distinguish right from wrong and to conduct himself responsibly? Such mixing is supposed to teach a lesson in democracy. This makes no sense to me. Obviously, no child will receive an education best suited to his abilities and vocational aims in such a school; nor will the bright child develop admiration and respect for the dullard, or the potential young delinquent profit from associating with well-brought-up children. It is far more likely that the dullard will be frustrated, the bright child bored, the average child never challenged mentally, the good child corrupted by the young ne'er-do-well, and everyone's manners and mores downgraded to a dead level of mediocrity.

Most of these disadvantages remain even when we take account of different learning capacities by setting up multiple tracks. They are an improvement over heterogeneous classes and I suppose we ought to be grateful that some educationists have finally made this concession to the urgent demands of critics and the public. But it is a somewhat amateurish way of dealing with the problem of children's unequal mental aptitudes. The small homogeneous school, characteristic of European educatin, does a much better job.

I do not believe that at a huge comprehensive school talented children can ever receive as good an education as at a small English grammar school, French lycée, or Swiss Gymnasium. In their enthusiasm for gigantic schools and democratic togetherness, American educationists overlook the difficulty of conducting under the same roof such varied enterprises as life-adjustment training, leisure-time activities, vocational training, and serious basic education, especially when the choice lies with the child as to which course he will take. How can we expect children to choose higher mathematics when their classmates are having fun learning how to play canasta, cook or find a mate? Why should an 8th grader tackle a hard subject when next door the kids are happily whizzing through a course in "Home and Family Living?" Why should he take tough exams when others get promoted on true-false tests posing such "difficult" problems as should boys use deodorants or can one use cake soap for shampooing?

I presume we do not wish to carry "democratic" education to a point where only children of the rich can afford to become professional people. Yet this would assuredly happen if we heeded those educationists who brand everyone as undemocratic who advocates special public schooling for our talented youth. Do we want the services of doctors, lawyers, engineers and other professionals? Well then we won't get them unless we provide proper schooling for those of our children who are willing and able to become professionals. To call this advocating that only an "elite" be well educated while the rest of our children receive an inferior education, making them forever hewers of wood and carriers of water, is highly irresponsible demagoguery. At present nobody gets a really good public education; what critics advocate is that everybody receive the best education he is able and willing to absorb. What could be more democratic?

Apart from the disadvantage of attending comprehensive rather than homogeneous schools, our children learn less than those abroad because we are confused about the objectives of formal education, because we set ourselves extremely modest goals, because our teachers lack the professional qualifications and status they enjoy abroad and labor under the handicap of being controlled in their professional work by an army of administrators and narrow specialists who dictate pedagogical methods, select textbooks, and determine curricula. It is these non-teaching persons, these so-called "professional educators," who shape American education and must be held responsible for its mediocre achievements.

The theories of progressive education have left a deep imprint which cannot easily be erased. Under their influence, educationists have gradually denuded the high school curriculum of its former solid content and filled it with frills and know-how courses; they have abandoned the concept that advancement must be earned by scholastic performance and substituted automatic promotion. In their determination to make the schools "democratic" and to keep the less able child happy, they have been raising a generation of Americans who expect to obtain all good things without effort and who acquire a wholly false notion of their own importance because they have never had an opportunity at school to compare their own true accomplishments with those of others.

Stung by criticism, American educationists are presently making an effort to shift the entire responsibility for watered-down curricula on the American public. But it was their own rejection of genuine education in favor of life-adjustment training that opened the doors to pressure groups hounding the schools with requests to teach their particular pet subjects. Moreover, the public has now awakened to the need for school improvement while educationists still erect roadblocks to prevent genuine reform. One has but to steep himself in the writings of leading educationists to sense their profound anti-intellectualism and dislike for quality education. The following passage taken from Kilpatrick's biography by Tenenbaum shows how and why our curricula have become divested of solid content:

"The writer has seen a class of six hundred and more graduate students in education, comprising teachers, principals, superintendents, vote their opinion in overwhelming numbers that Greek, Latin and mathematics offered the least likely possibilities for educational growth; and with almost the same unanimity they placed *dancing*, dramatics and *doll playing* high on the list in this regard." (My italics.)

We and we alone among all modern democracies have devalued our intellectual currency; we have downgraded the high school diploma to a point where it does not even promise comptetence in elementary subjects, as witness the need of many graduates to take remedial courses at college in reading, writing and arithmetic. Educationist dogma declares that nevertheless children are better educated today than in the past. If we go back far enough this is probably true. Our country never had as good an educational system as the more advanced nations of Europe; it was late setting up a tax-supported school system. Our children sit in school many more hours, days, and years today than seventy-five years ago and we spend forty times as many tax dollars to keep them there. Even allowing for the steady erosion of the value of the dollar, they ought to have learned a bit more at a per capita cost of $135 in 1954 compared to $7.91 in 1880. Or so one would think.*

The American dream of making *higher* secondary schooling available to *all*, free of charge, has however not been realized because we have downgraded the high school until it provides for a majority of children not very much more real education than is normally acquired elsewhere in elementary schools. I do not wish to enter into the battle of statistics about how many high school children take what subjects. I merely wish to point to the decline in foreign language teaching I believe this decline was a direct result of progressive dogma that life is not "enriched" by learning foreign languages unless these are actually spoken in the community in which one lives. Even today, when many parents have taken the initiative in arranging foreign language courses for their children, and when our leaders publicly deplore our linguistic illiteracy, many educationists remain strongly opposed to such courses.

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* See United States Statistical Abstract.

Two years ago, Secretary Folsom stated that while almost half our high school students were studying at least one foreign language in 1928, by 1955 only 20% did so. The standard educatinist reply to similar statistics is that more children go to high school today and that the new ones are too stupid to take academic courses. But about the same percentage of children attended high school in 1928 as in 1955, so the argument has no merit. I will not go into the low value our educationists place on the intellectual abilities of poor children, except to call attention to the fact that all Russian children learn at least one foreign language. Do American educationists seriously claim that our children are less able? The more I learn about education, the less am I willing to believe that all but a minority--15% according to one leading educator--of our children cannot absorb solid subjects. True, only a minority learns them easily but many more could learn them with effort and if they were skillfully taught.

Skillful teaching can be had only if one grants teachers full professional status and in return demands that they be as well educated as other professional people. We have allowed our teachers to become little more than employees of administrative educationists who, under our scheme of things, occupy the best paid and most influential positions in educational officialdom. It is they who presume to speak with the voice of education; rarely does one hear from a classroom teacher except through anonymous letters to editors and critics.

Most of the pedagogic errors and monstrosities that infest our schools originate in administrative directives coming from persons high in the hierarchy of educational officialdom who have themselves rarely had any classroom experience. Seldom is the real expert--the teacher--consulted in the matter of curriculum planning, pedagogic methods, and selection of textbooks. He is simply handed the newest products of progressive theory based on the very latest so-called "psychological research" and told to apply them in class.

In the words of one teacher who finally quit in disgust: "One year it was bundles of wooden sticks and red and blue poker chips--millions of them!--to replace the multiplication table and give the children a sense of learning by doing. Another year it was a series of readers, so arranged that children could be taught to read without the boring and unlifelike process of learning the alphabet! Yet agin it would be a revised social studies curriculum, according to which students were to spend weeks on 'Orientation to School,' 'My Family,' and 'Our Neighborhood,' while ancient history was resolutely dropped from the course of studies altogether."

The subordination of American teachers to their non-teaching administrative superiors is in glaring contrast to the professional independence of teachers abroad where educational administrators are unknown. European school principals are invariably themselves experienced teachers who keep their hand in by giving a few courses to the upper grades. The highest job in a European university--that of rector--goes to a professor elected to this office for one year by his colleagues on the faculty. It would be inconceivable to anyone abroad that an ex-athletic coach be set to direct the affairs of an educational institution. The idea that schools and universities need public relations staffs strikes European educators as utterly ludicrous. I confess I myself cannot help wondering why a tax-supported school should need such a staff; is this really a necessary expense? Nor do foreign educational systems engage hordes of testers, guidance personnel, record keepers and the like who increase the cost of education here without making it noticeably more efficient. One may well wonder just what qualifications are possessed by all these people who manage our schools and our teachers.

Well, they usually possess high academic degrees but these may well have been acquired in a wholly unacademic way by learning how to manage school plants, purchase supplies, disburse pay and deal with personnel problems; nowhere in the world can one find such strange "original research" as will get one a doctorate in Education in this country. "The Junior Hostess Volunteers at the USO Lafayette Square," "A Comparison between the Readability of Digest and Original Versions of Articles," "An Evaluation of Innovations in Elementary School Classroom Seating," are but a few samples. Ex-athletic coaches turned superintendent or principal may have won their doctorates by writing a thesis on "Personality Traits of Athletes" or "School Camping in New Jersey." Curricula and teaching methods may be prescribed by people considered psychological experts on the strength of such studies as "Relationship of Playing the Pinball Game to Personality Dimension."

In the traditional American school, before progressive education took over, and in schools abroad, judgment of a pupil's educational progress is the responsibility of the classroom teacher. Here we seek to eliminate his "subjective" judgment by "objective" machine-processed tests. These can never, in my opinion, do as good a job as can a teacher who remains with his class for long periods of time and thus gets to know each pupil intimately. At best, mechanical tests measure isolated abilities while the traditional essay-type or problem-solving examination gave a broad basis for evaluating a child's real achievement.

Abroad, elementary teachers still take the same class through four or more years; in secondary schools professors teach two or three related subjects to the same class through several grades. To do this, teachers must of course possess a more rigorous professional education than is commonly possessed by our own teachers. We fool ourselves if we think mechanical tests can take over the job of measuring educational advance. We merely clutter education with a new lot of non-teaching specialists--the testers. Nothing can nowadays be done before the testers have had a go at it. Now that we finally have a federal education act which recognizes the importance of adequately educating our talented children, we cannot get on with the job but must first let the United States Office of Education undertake a so-called "talent inventory," giving employment to lots of testers.

I cannot see what all this testing is supposed to get us. We know our children ought to be better educated; to keep on testing them will not alter that fact. Nor is it clear to me how one inventories talent by making children answer yes or no to such statements as: "My parents treat me as if I do not know right from wrong," or "Dad always seems too busy to pal around with me," or "If you don't drink in our gang, they make you feel like a sissy." We would do better to use the money wasted on such tests to educate more good foreign language, mathematics and science teachers of whom we have far too few; incidentally, we could do with fewer testers!

The work of testers, guidance personnel, and a host of other administrative functionaries could be done a hundred times better if we insisted that our teachers be as well educated generally and professionally as they are abroad, and if we then gave education back to them. We have gone overboard on mechanical aids and on so-called objective tests of the multiple choice type which appeal to us because they seem so businesslike and make school take on the aspect of an efficient business office. But nothing can replace a really good teacher. We had better face up to the fact that we must get them,pay them well and treat them as professionals if we wish to educate our children properly.

American education is top-heavy with administrators; it lacks the scholarly leadership under which foreign educational systems attain high scholastic achievements. School reforms will not be generated from within a bureaucracy run by non-teachers whose intellectual parochialism and lack of classroom experience prevent them from recognizing our educational deficiencies. Nor will the present leadership of our public schools permit outsiders to criticize our schools with impunity; still less take heed of warnings by critics. As is the case with most administrators who control large bureaucracies in this country, the men who manage our schools tend to look upon public education as a personal domain in which their rule is absolute.

For the past ten years I have been keeping a record of all major criticisms of American education and of the reaction thereto of "professional" educationists. In reading through a mass of material pouring from the pens of individuals and professional organizations, one is struck by the monumental self-righteousness which pervades educationist reaction to criticism. One can find no evidence of an awareness that, in view of the present state of American education, the critic might just conceivably be sincere and have a well-reasoned case to present for school reform. All criticism is contempteously dismissed, even when it is voiced by anxious parents or by citizens' committees formed to induce their local schools to change curricula or teaching methods. All are patronizingly told to leave such matters to the "experts;" any citizen who becomes too insistent is likely to be subjected to personal vilification and this is of course also the lot of those who criticize education in general.

For anyone who wishes to inform himself on this subject, I recommend a series of articles by Howard Whitman which Colliers published five years ago, beginning February 5, 1954--the first was entitled "Speak Out Silent People." They are well worth reading, if for no other reason than the documentation they contain on the extraordinary difficulty experienced by the American public whenever it tries to induce local schools to abandon progressive methods considered harmful to the children.

One such campaign was fought to induce the schools to return to the phonetic method of teaching children to read; parents were getting tired of having to take over the teaching job themselves. Another over report cards which did not measure a child's scholastic achievements but limited themselves to such vague statements as "normal growth is taking place." Still another over getting the schools to reinstate script after they had quietly decided to teach children only to print. That one gave rise to great bitterness. One indignant member of a parents' committee remarked: "We found out what many other parents have found out when they tried to make their voices heard by school authorities. We found that schools no longer belong to the people.. The 'professional educators' have taken over, and public be damned."

These are but a few of the many cases where educationists put up determined resistance to citizens' committees demanding abandonment of progressive teaching methods in their schools. Yet leaders in education are forever praising the principle of "local control over our schools" as the chief glory of American education. They are forever invoking this principle when proposals are made to end the present educational anarchy in this country by setting voluntary national standards for high school diplomas and teacher certification which would give communities a yardstick with which to measure school performance.

In the light of the cavalier treatment meted out to parents and other citizens worried over educational shortcomings, one cannot help wondering how sincere educationists are in their professed devotion to the principle of local control over education. Do they really believe in this principle so strongly that to them even a voluntary national standard smacks of federal tyranny? Or, is not their hostility to such standards merely part of their general intolerance of criticism whatever kind it may be and from whatever source it may come.

Of this intolerance there can be no doubt. It is glaringly manifest in the avalanche of words with which educationists seek to demolish criticism and the critic. I have most of it in my large collection of material documenting the educational history of our country for the past half century. There is so much of it that it overflows a large bookcase. When one has the educationist countercase all in one place and so can absorb it, as it were, in one gulp, one is struck with its sameness. It almost seems as if a central strategy board had issued directives on "how to deal with the critics!" Allowing for differences in the personalities of writers and in their writing style, one finds virtual unanimity among them that, barring the need for more money, there is nothing wrong with our schools--they are "the best in the world." Consequently all criticism is unjustified and all critics are "enemies of the public schools."

In order to "prove" that our educational system is inferior to none, educationists will try anything. Now that they are faced with so much evidence brought in by critics that European education is better than ours, they are redoubling their efforts to convince the American people that national school systems cannot be compared because each reflects the mores and culture of its particular society. A favorite gimmick is to show how inappropriate European education proved to be when it was applied to backward peoples in European colonies; how little meaning an Indian child would get from learning about the Norman Conquest or an African bushman about Louis XIV. I can only say in reply that for myself, I do not consider us as far removed from European civilization as Indians or Congolese. Nor am I comforted when educationists tell me that our education must be excellent since so many students from backward nations come to the United States to study at our colleges and universities. Possibly free scholarships have something to do with this.

However, I am quite willing to concede that schools in Outer Mongolia are worse than ours. What of it?

I find educationist attempts to convince us that no drastic reforms are needed in our school system utterly unconvincing. What is more, I don't believe they can make it stick. Not even by pouring their wrath on the critics. It is surprising how far gentle school men are willing to go to demolish the disagreeable disturber of the educational peace.

As to his motives, the party line is that these are always suspect unless the critic is paid handsomely by some Foundation, in which case he will not be vilified and can get away with a fair amount of real criticism. The free-lance critic, however, is fair game; it will be hinted that he may be part of a sinister conspiracy engineered by forces of the left, the right, or of both the left and the right--at any rate sinister. Or perhaps he is an unadjusted, lonely person who doesn't get along with people, who has had an unfortunate childhood that leaves him full of frustrations which he takes out by trying to destroy the schools (it is axiomatic that the purpose of all criticism is "to destroy the schools"). Or perhaps he criticizes to make money. In one of the nimblest reversals of factual truth, a critic was once accused of criticizing to gain prestige!

I dislike getting personal but what I say has been so thoroughly misrepresented that I should like to go on record on a few points. I speak about education as a private citizen; my official duties give me no access to secret, educational information--everything I use is available to the public and can be found by anyone taking the trouble to look for it. Nor does anyone order or pay me to talk about education. Sometimes fees are offered; I have made it a rule to ask that these and royalties from my book be turned over directly to specified charities. My concern with education is a wholly private and volunteer activity. If anyone takes the position that this concern with education interferes with my official duties, I challenge him to prove it. A social critic is, of course, fair game for everyone.

Angry educationists are forever demanding that I stop meddling in matters of no concern to me and that I stick to my trade of building reactors. Such reasoning shows a profound misconception of the rights and duties of democratic citizenship. It would have us all become what the Greeks called *idiotes* -- private persons who take no interest in civic matters. Our educational bureaucracy is in this respect no different from other bureaucracies and pressure groups who seek escape from all criticism by branding the inside critic as a disloyal traitor to the organization, and the outside critic as a troublemaker without qualification to judge what the bureaucracy does. Unless we scotch this attempt to make of criticism a modern kind of *lèse majesté*, we shall assuredly lose control over the powerful organizations that increasingly control our life. These organizations tend to forget they were set up to do a specific job and that when they fail to do it satisfactorily, they must expect to be criticized. In particular, no *public* agency can conduct itself indefinitely in a manner which harms the nation as a whole without being castigated in public.

Having called a critic's *motives* into question, educationists invariably proceed to declare his *facts* are wrong or at least suspect because he has not documented each of them (which would be rather difficult to do in a speech but this is conveniently forgotten). They claim he cannot really say anything worth listening to about education unless he has personally inspected every school in the country, sat in every classroom of every school, and listened to what every child in every classroom of every school has said. This is held to be the only "scientific method" of establishing facts--an obvious aping of the scientific methods of the exact sciences when they seek to ascertain the laws of nature. It is as if educationists were not aware that much can be learned by reading books and official documents, statistics and examination questions; by comparing the products of our schools with those of others, by a hundred methods involving thought, reasoning and judgment, and by drawing on a fairly broad knowledge of the world.

When I find a statement of mine, based on official sources and subjected to a careful check by experts--such as my remarks on Dutch education--being airily dismissed as wholly erroneous by some educationist who claims to know all about Dutch education but who does not bother to support this accusation, I am sorely tempted to draw up a bill of indictment on factual errors committed by educationists. So far I have not yielded to so ignoble an impulse and I hope I shall continue to resist the temptation.

But I cannot let the third attack on the person of the critic go by unanswered; this is the educationist argument that, unless he is part of the public school system, a critic is not qualified to speak on education.

In The House of Intellect, Jacques Barzun calls this viewpoint a "superstition that understanding is identical with professional skill," which he brands as denial of intellect, and so it is. The attitude of educationists that they alone possess knowledge and wisdom in all things concerned with the learning process is not convincing, coming as it does from people whose own education--general and professional--is rarely impressive.

To carry on my assigned task in nuclear propulsion, I need intelligent and well educated men. Though a great many of our best college graduates and officers apply, only a small percentage show enough promise to be accepted. We then have to take time out to set up courses teaching these very bright young people fundamentals they ought to have learned at school and college; that indeed are taught such young people abroad. Obviously, all this holds up our work. Similar developmental projects suffer from the same scarcity of qualified people. The schools do not supply them; their products are unsatisfactory. The failure of the schools to turn out the kind of products this nation sorely needs today gives me a right to criticize them.

Angry educationists often threaten to tell me how to build nuclear submarines. My reply is that if they have as thoroughly studied nuclear physics and engineering as I have education, if they can devise better ways to build these ships, we in the naval reactor group would gladly welcome their advice. We are deeply appreciative when people take enough interest in our work to think up new ideas. So far we have not received any from educators.

Compared to nuclear physics and reactor technology, education is a fairly simple subject. Any intelligent layman can obtain a thorough understanding of its problems, principles, and the performances of different national school systems. As to what our schools teach, how they teach it, how they are organized to do this job and what they accomplish in twelve years of schooling--these are matters which one can quite well grasp without having first taken the required number of courses on Education at a teachers' college which constitute almost the sole qualification demanded of American educators.

In truth, the critic's lot is not a happy one. Yet he has a useful role to play in a democratic society; he is an important part of the democratic process. He finds the facts we need but rarely have the time to discover for ourselves, and on which we base our decisions on national issues. He alerts us when the bureaucracies now dominating life start marching ponderously down a dead-end street of error, and so gives us a chance to put them back on the right road before it is too late. One hopes that present warnings of educational critics will be heeded before it is too late for us to catch up in those areas where Russia has forged ahead of us because of her greater wealth in trained professional people.

It should never be forgotten that it was critics who first called attention to the Russian educational menace; educationists didn't get around to checking on Russian schooling until last summer, but scientists and engineers reported what was happening in Russia in 1953, and in that year I myself began to speak of this danger. I never thought that by calling attention to this ominous development I would become an "enemy of American education"; or that comparing Russian schools with ours would make me the favorite bête noir of educationists who see fit to call me hysterical, a lover of Russia, a warmonger and a jackass. At that I consider myself fortunate since I have not yet been put in a class with Dillinger and other professional murderers. This has happened to another critic whose sincerity and scholarship I admire.

Comparisons with foreign school systems are painful to American educationists and one regrets that. But it cannot be maintained that they are not relevant.

It is through comparisons that critics try to demonstrate our deficiencies to the American people so they can do something about them. Fifty years ago, medical and legal schools in this country were a disgrace and a scandal. Two famous studies comparing them to similar schools abroad were written under the auspices of the Carnegie Foundation. They created a furor and inspired such drastic reforms that we soon got professional schools as good as those of Europe. Today's critics hope that by comparing general education here and abroad, they will bring about a similar upgrading of our public schools.

Educationists will doubtless continue to fight reform and hold it up as long as they can. As I said, at the beginning of this speech: I anticipate that the campaign will go on for many, many years. As long as I am able to stand up and express my views, I shall keep on fighting for schools that will really "educate" our children--all of them.

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A NATIONAL STANDARD FOR EDUCATION

by

VADM H. G. Rickover, USN
at the
Annual Dinner Meeting
of the
Greater Grand Rapids Chamber of Commerce
Grand Rapids, Michigan
Thursday, April 18, 1963

I am delighted to be here in the home territory of my good friend and fellow naval officer, Gerald Ford, and to speak to his many friends. I should like first to pay tribute to Mr. Ford and to the members of the House Appropriations Committee. Mr. Ford has served on that Committee since 1951. In the last few years the Nation has been able to place in operation 18 nuclear powered attack submarines and 12 Polaris submarines, together with the nuclear powered aircraft carrier ENTERPRISE, the cruiser LONG BEACH, and the destroyer leader BAINBRIDGE. We will also have under construction or authorized by the end of this year an additional 29 attack and 29 Polaris submarines and another destroyer leader. For this we must give credit to Gerald Ford and his colleagues on the Appropriations Committee.

I speak from personal experience when I say that without the support he and members of the Committee have unfailingly given, conversion of our fleet to atomic energy would have been delayed and might have come too late to be of use to the United States.

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As a member of the Defense and Space Subcommittees, Mr. Ford has had, among other things, to become expert in judging difficult technical matters such as electronics, satellite communications, advanced computer systems, atomic energy, and the research and development which pertain to them.

Mr. Ford has constantly and wholeheartedly supported the Naval Program and devoted much time and effort to helping us. It is a comfort to be able to go to him for his wisdom, his objectivity, and kindly advice. I am proud to be associated with so fine a gentleman and patriot who does such honor to his state.

The one thing all of us have had to learn in our work in atomic energy is that we cannot indulge in illusions. To design and build atomic power plants we have to face the truth and come to terms with it. I fear that in education we have not always been doing this, so it seemed appropriate to speak to you on A National Standard for Education.

I presume you are as deeply concerned, as am I, with American education, and as desirous that it be the best that can be devised. There is overwhelming evidence that our children do not receive a good, still less the best possible education. So the question arises: "Why not?" There are many reasons and I have spoken elsewhere at length about them.

We have a philosophy of education that simply does not work, an educational establishment that has too many administrators and researchers who boss the teachers, and teachers whose educational and professional qualifications are inadequate; these are but a few of the causes of low academic achievement. Underlying all of them, accentuating and perpetuating them, is our lack of a national scholastic standard. This renders our schools highly susceptible to the strong pressure toward mediocrity that is present in any system of mass education. It also makes reform difficult and, if accomplished at all, likely to come about in a piecemeal fashion that will increase the already very great geographic inequalities that characterize American education.

It is to this defect and the urgent need to remedy it that I would like to address my remarks.

American schools and diplomas have always been qualitatively of the most amazing diversity. This was probably unavoidable in earlier times when Americans were still engaged in subduing a wilderness. Different parts of the country were than at different stages of development. And, of course, education reflects the state of culture. High culture comes when the material necessities of life have been provided for. Education was bound to be better in the long-settled communities along the Atlantic seaboard than in pioneer country.

Today technology has brought culture to the remotest farm. A child's educational needs are now the same whether he goes to school in Florida or California, in Wisconsin or Connecticut. Every American youngster must have knowledge of the basic subjects: of language, mathematics and science, of government, geography and history--all up to the highest level he is capable of achieving. Every child has the same need for development of his intellectual capacities so he will be able to reason logically and understand the complex world in which he lives and the public issues on which as a democratic citizen he is called to express independent and rational opinions. All our children need a good basic education to qualify them for the kind of jobs a highly technical society provides. Less and less will there be rewarding work in this country for the uneducated, no matter where they may live.

Is not the need for this knowledge and this skill the very reason why we have a public school system? We support it with our taxes because parents have neither the time nor--with rare exception--the competence to develop their children's mental capacities and guide them to intellectual maturity. As I have often stressed, schools that have our children in their care for but one sixth of their waking hours--no more than the average child spends sitting before the TV screen--such schools cannot perform this task properly if they dissipate their energies on matters that can be done elsewhere. Education directed to the mind cannot be obtained anywhere else except in schools, colleges and universities. These must therefore be judged by the competence with which they perform this all-important task.

I readily admit that as places for fun and games American educational institutions are unsurpassed in the world. But what concerns me is their performance in the intellectual field; what I call the school's "technical" task. It is just here that American education fails to live up to the needs of our society. It is here that there is too much scholastic inequality within our country. It is here that our competitive position vis-a-vis other advanced countries is unsatisfactory.

How is this possible when we pour so much money into education; when we offer it so generously to so many of our children? For over a century we have been committed to the ideal that no American child should be denied an education because his parents were too poor to pay school fees. We set ourselves this ideal early in our history, when we had no illusions of superiority; when we knew we were educationally backward. In many

Continental countries free universal and compulsory elementary education had long since been established. We did not attain even this until just after World War I, two hundred years later than parts of Europe.. But we were not content with merely catching up, we wanted to go Europe one better. We wanted secondary and even college education to be tuition free so our children should meet no financial bar in their climb to the very top of the educational ladder. This is what we then meant by "democratic" education, and that is what it really is.

Alas, our splendid ideal has foundered on the shoals of educational misconceptions about "democracy" and "education." Adherents of the progressive theory of education, in particular, have confounded "ability to pay" with "ability to learn," as when one eminent educator declared that we were unalterably committed to undifferentiated, comprehensive common schooling which, said he, "will unite in one cultural pattern the future carpenter, factory worker, bishop, lawyer, doctor, sales manager, professor and garage mechanic." Indeed you can keep children of widely varying mental capacities, motivations and educational objectives together in a common core program, but this is not education.

A child's--or his parent's--inability to pay for schooling is a removable bar to education; the child's inability to learn is an irremovable bar. Many a poor child is gifted, many a rich child is stupid; either child may be industrious or lazy. It is the giftedness or stupidity, the industriousness or laziness that ought alone to determine the educational levels a child may attain. When you eliminate "ability to pay" you get educational democracy; when you eliminate "ability to learn" you get noneducation.

In the past, when the "common school" of America served simple rural communities, we could tolerate keeping children of varying aptitudes in one schoolroom. The school did not extend beyond the primary years during which the subjects taught were elementary. These elementary subjects _can_ be mastered by every normal child, though at greatly differing rates of speed.

In the small red schoolhouse a skilled teacher could manage things so that the fast learner progressed fast, the slow learner progressed slowly, without seriously interfering with one another. But as soon as you move beyond the elementary level, differences in aptitude create a situation where what the bright can and should study becomes incomprehensible to the average student. Each year the gap widens between children with varying intellectual capacities.

Between the two extremes of intelligence in a representative group of children, the gap in _mental age_ will be almost 6.5 years in the sixth grade; even if the top and bottom two percent of the intelligence range is eliminated, the gap will still be over three years. Worse still, the gap in _achievement levels_ is even greater; by age eleven children it may be eight years.

Pleasantly democratic as comprehensive schooling may _seem_, when continued into secondary education it does justice neither to the fast nor to the slow learner. Nor is there anything "democratic" about automatic promotion and unmerited diplomas. If a child is promoted before he has mastered a prescribed grade course, he will only _seem_ to move up the educational ladder. In reality he will be standing still on the same rung, but this is camouflaged by educational labels that are as false as when sugar syrup is marked "honey" on the glass jar. When diplomas are awarded for mere attendance, they soon lose all value.

A child who obtains a high school diploma when he cannot yet read and write with ease and dexterity, has not really received a secondary education. True, he has been kept at school more years and his school has a different name but he has not mastered more than an elementary program. He hasn't even mastered that well. As for the high school diploma he carries away, this has necessarily shrunk in value so that in many cases it represents no more today than did grammar school graduation half a century ago.

Even as we have made "higher" education available to more children by eliminating fees, so have we taken away with one hand what we have given with the other. By not requiring so-called "higher" education and its diplomas to meet a fixed national standard, we have brought them down to what Dr. Robert B. Davis of Syracuse University so aptly terms "creeping lowest denominatorism." In the absence of a standard, our diplomas and degrees have inevitably suffered the fate of paper money that is not backed by gold bullion. As indicators of a student's educational accomplishment, the degrees "aren't worth a Continental." You have to look up the institution that issued them and the course for which they were granted in order to evaluate their academic worth.

In this they are as different as can be from diplomas and degrees abroad which must conform to a national standard, and this whether they are issued in countries with a centralized or with a decentralized system of education. The irony is that our educational ideal has been adopted abroad where it is now being rapidly realized and realized better than here. For there scholastic standards have been retained. The "higher" education now attainable by children in Europe, either at no cost, or on scholarship, or for very small fees, is as good or as "high"--academically speaking--as it ever was. This important point is always overlooked when quantitative comparisons are made between American and European education. We go by labels and we do not inquire what the labels stand for.

Naturally we have more children with college degrees, since we hand these out for intellectual work that nowhere else in the world is held to be of "academic standard." What other country grants master degrees for trailer park management, bachelor degrees for domestic science, or doctorates for thesis work on "Field Hockey in American Education with Special Emphasis on the Colleges of the Northwestern United States?" It is as if we had decided to print enough money to give every child a million dollars upon graduation from high school and then declared proudly that we had become a nation of millionaires!

Apologists often argue that in as populous a nation as ours you cannot have a national scholastic standard. But size has little to do with this. There is greater equivalence in degrees among the advanced countries of the Continent than exists within our country, yet they are politically divided and we are not. Taken together they are as heterogeneous and as populous as we. However, no country abroad wants to fall behind, so each informs itself on what goes on educationally in neighboring countries and makes certain its national standard is up to par. I should like to see a similar thing happen among the several states of the American Union. This kind of competition is altogether good, and the beauty is that it does not cost more to have good education than mediocre life-adjustment training. The latter, in fact, requires more expensive equipment. For the money we spend on some of our educational palaces with their swimming pools, model kitchens, workshops, athletic fields, etc., we could get first-rate teachers and put them to work in simple buildings, and you would be surprised at the results.

As a practical man I judge educational enterprises by their products. Thousands of these products pass through my hands and those of my leading scientists and engineers when we interview young people who apply for positions as designers and builders of nuclear reactors, or as officers and men to operate our nuclear ships. I find the percentage so qualified to be deplorably small. Even the best have lacunae in their education that you would not find abroad among persons of comparable intellectual stature. We run schools for reactor technology where we have to teach many basic subjects which in other advanced nations already have been taught at school.

A new engineering project, such as development of nuclear power, is a good touchstone for a modern educational system. It calls for mental qualities that are in wide demand in all parts of a highly developed industrial society. Flexibility and toughness of mind, in particular; the ability to emancipate oneself from routine, and to pioneer new ideas; the capacity to think "professionally," as I call it, that is to view problems in a scientific spirit that disregards personal predilections. This latter quality has become scarce since the schools went over to life-adjustment training, with its emphasis on conforming to one's "peer" group. We badly need people who in their fields of special competence will stick to principle; people who will not compromise technical or professional judgment in order to "get along" with administrative superiors or to gain popularity.

To sum up: the over-all level of general and specialized education in this country is far too low for our needs, both as individuals and as an industrial democracy.

We are plagued with serious deficiencies in virtually every class of occupation that makes demands upon a person's general and specialized education, whether it be at the level of the "learned" professional, the semiprofessional, the skilled craftsman, or the technician. Despite our enormous and costly educational establishment, this country has more functional illiterates than most other industrially advanced nations. We have more people who do not possess minimum knowledge of the elements of language, mathematics, history, and geography that are considered part of elementary education in advanced European countries and which every normal person there appears to absorb at school. Recently, the Army published the fact that 25 percent of draftees were unqualified to be modern soldiers--25 percent of a cross section of young America! In most cases the deficiencies were mental. In Switzerland, where every male does military service, the rejection rate is about seven percent. Swiss standards for draftees are certainly no more lenient than U.S. Army standards. I refuse to accept this appalling difference between rejection rates of seven percent and 25 percent as reflecting on the intelligence and educability of American youth. I blame American schools for this.

Compared to other advanced countries, American education is extremely inefficient. It wastes an inordinate amount of time and costs the taxpayer tremendous sums of money. For lack of an accepted standard, there is poor articulation between one grade and the next, between one school and the next higher. Repetition is inevitable when promotion is automatic. Teachers cannot at the start of the school year count on children in the new class having completed a prescribed course of study in the preceding grade. And so our schools cannot have the orderly sequence of carefully planned curricula that makes European education so efficient; where each year builds on what has been learned before and there is no needless rehashing of the same subjects nor any gap in knowledge that might hinder orderly and rapid educational progress.

We have a fantastic stretch-out in education. It takes average American children 12 years to reach achievement levels their counterparts on the Continent attain in a little over eight. The American bachelor degree comes at the end of 16 years of schooling, the Continental degree at the end of 12 to 13. At that, Continental holders of the baccalaureat are better educated than the majority of American college graduates.

The slow pace of American education harms all our children. The less able get discouraged and drop out before they have even acquired what abroad would be considered an elementary education. As late as 1958 a quarter of our youth quit school at the end of the tenth grade or earlier, and ten percent quit at the end of the fifth grade. Only half our children obtained a high school diploma. A decade earlier the situation was worse. Well over half dropped out with less than ten years schooling; one quarter with no more than five years; and only a third completed high school. Those who did not stay on through high school received less basic schooling than has long been required of all Continental children, whose attendance during the compulsory period is virtually 100 percent. In consequence we still have eight million "functional illiterates" while parts of Europe have been wholly literate for a century, in some cases for a century and a half.

Educational inefficiency wastes the best learning years of our talented youth and contributes mightily to shortages of "professionals," men and women with fine minds and high educational qualifications without whom no modern nation can function properly. As you all know, we have a chronic teacher shortage we seem unable to overcome. It is aggravated by the educational stretch-out for, since it takes American schools longer than necessary to attain a given scholastic level, we need proportionately more teachers. We have a serious shortage in medical personnel. Currently, we are trying to lure nurses from Canada. We import almost a quarter of our physicians from all parts of the world since each year we graduate only three quarters of the number we require. Despite all our efforts to encourage more young people to enter engineering, our deficit grows year by year. We need 72,000 new engineers annually but graduate only 45,000. The Russians graduate three times that many and their engineers are competent. Former Secretary Ribicoff warned that we were coming dangerously close to a point where the balance of brain power in this important area may tip decisively against us.

Observe how the stretch-out contributes to our doctor shortage.

Because of it Americans must put in three or four extra years before they graduate medical school. Mind you, these are not years added to their professional education; they will not make them better doctors. These years are the result of educational inefficiency, pure and simple. They are required because it takes that much longer to reach the bachelor degree in this country. You can figure for yourselves how much these needless years add to the expense of becoming a physician. Since in this country 80 percent of the cost of a medical education must be borne by the student, the school stretch-out will inexorably bring us to a point where only children of the rich can afford to become physicians! Even today families with incomes under $5,000 supply only 14 percent of our medical students, yet these families make up 50 percent of the population. As a result, the number of applicants to our medical schools is currently decreasing, yet with a soaring population we need more doctors.

The same shortages plague us in skilled labor. We have too few skilled and too many unskilled workers; exactly the reverse of the situation that exists in Europe where many countries are scouting as far as the Near East to find unskilled laborers. Switzerland has to import virtually all she needs in this category--she produces almost no unskilled workers herself. England's working force is 50 percent skilled, 12 percent semiskilled. Russia has a tremendous training program for technicians. Her technicums annually graduate 250,000 engineering technicians alone; we graduate 16,000.

Educational inefficiency hurts our children and it hurts the nation. It also makes ours the most expensive school system in the world. We spend more money to carry a child to a given level of scholarship than any other country. This is a serious matter, given our very rapid population growth--almost three times more rapid than in most European countries. In the last ten years state taxes have doubled, I believe, with education accounting for most of the increase. Can we just go on that way? According to the 1960 U. S. Statistical Abstract, the average cost per pupil in 1900 was $16.67; in 1956 it was $294.22; it has risen much higher since then. Some states now invest over $500 per pupil each year. Even making allowance for the shrunken value of the dollar the educational results are hardly commensurate with this enormous increase in cost.

There is a limit in free societies, no matter how relatively affluent they are, beyond which people cannot be made to sacrifice, especially when those who proportionately pay most quite often get the smallest personal benefit. Some school districts are approaching the point where no more taxes can be wrung from the populace. It is becoming increasingly evident to thinking Americans that the problem of oncoming enrollment increases cannot be met merely by raising school taxes ad infinitum; we must also make a major effort to obtain a greater yield in genuine education for our tax dollars.

What then is to be done to improve American education? Well, local communities and state governments have the power to increase the amount of classroom instruction per school year. We have the shortest school day and school year among leading nations. They have the power to eliminate from school curricula everything that can be learned elsewhere. We are the only Western nation where precious school hours are wasted teaching children how to make fudge, twirl batons, drive cars, budget income, handle the telephone, catch fish, and become "likable, lovable and datable." They could improve teacher qualifications, bringing them up to the level existing abroad, and they could then put the educational enterprise under the supervision of our best teachers, giving them the necessary clerical and administrative assistance. Abroad where teaching is an honored profession, no one would dream of putting nonteacher administrators in charge of schools. We are the only country where teachers are bossed by educational administrators who often as not can lay no claim to scholarship, superior intelligence or higher education, and who may not have had experience in classroom teaching. Ex-athletic coaches are often made school principals, incredible as this may seem.

Those suggested steps indicate the direction in which we must move. A few communities alert to the problem have begun to act, but progress is still extremely spotty. Of course, it is encouraging that CALTECH now gets highly qualified students but its freshman class numbers only 182. The raising of admissions standards in the Ivy League colleges has had a most salutary effect on bright high school students who all of a sudden realize that a good education requires exertion. But the Ivy League colleges enroll fewer than one percent of all our college freshmen. One can easily be fooled by enthusiastic press reports about this or that innovation which supposedly will at one stroke raise education sky high. "From kindergarten to college in five years" the advertisement for one mechanical gadget promises. I do not think our deep-seated educational deficiencies can be overcome that easily; on the contrary, quite extraordinary effort on the part of the public, of parents and of public officials will be needed.

Specifically, I am convinced we cannot put through a really effective reform program unless we set up a national scholastic standard--a permissive standard, of course—but nevertheless potentially a great influence for good. Many countries have, at one time or another, discovered their educational systems to be unsatisfactory. I know of none that has been able to carry out speedy reform without making use of some such standard. Indeed we are the only advanced nation without a national scholastic standard.

Now the word "standard" has many connotations. I use it in the sense that comes first to mind: a specific requirement or level of excellence deemed worthy of esteem or reward. Not a *law*, enforceable in the courts; falling below standard does not put one in jail. Nor a *conventional rule* imposed by society; failure to meet the standard does not get one socially ostracized. No one *has to* live up to the standard. It is simply an *optional criterion* for determining the value of an act or accomplishment. For those who accept the standard it becomes the yardstick by which the worth of these acts or accomplishments is determined.

I do not share the pride our educationists take in the fact that we are the only leading nation with a school system that does not challenge its children to meet a national scholastic standard in order to receive academic rewards. I do not agree with them that children must not be "judged;" that each child has a *right* to "equal education and equal status;" hence that, as one superintendent of schools put it, "straight thinking and democratically minded school administrators" will hand out the same diploma, "regardless of the variation of high school courses and the range of scholastic achievement that are presented by the graduates as evidence of accomplishment." I think this educator misreads the whole purpose of academic certificates when he notes with approval that: "No longer does the diploma in its wording discriminate among the graduates, as was once the case when it carried the name of the course in which the student went through school, consequently implying that the accomplishments of the youth who did not take the highly academic lane were less worthy."

Nor do I share educationist concern that children who do not measure up to a standard will suffer pain and lose face. I suggest we set up a standard for different levels of aptitude, but in each case representing not the "average" accomplishment but the "highest" level children of this ability can with effort achieve.

All of life is a series of tests. Young people will be better able to take these tests in their stride if at an early age they begin to learn that everything worthwhile requires great effort but that the satisfaction derived from attaining a standard makes effort worthwhile. Given the wide differences of aptitude with which we are born and which we do not know how to alter, is it not good for young children to discover that some goals are beyond their capacities; that they cannot win all the tests? It is better to know one's limitations, as well as one's capacities, than to live in delusion which life sooner or later will rudely shatter.

Every American wants the best for the children of our country. In education the best we can give them is the chance to stretch their minds and reach the highest goal their intellect can encompass. "Democracy," wrote the late Dorothy Thompson, "is not to be conceived of as an invitation to share a common mediocrity, but a system that allows each to express and live up to the special excellence that is in him."

Last May, in testimony on English education before the House Appropriations Committee, Chairman Clarence Cannon asked me by what means I thought Congress might help to speed educational progress. I suggested that a National Standards Committee be created. This would be a small Committee composed of men of national stature and eminence--trustworthy, intelligent, scholarly and devoted to the ideal of an American education second to none. The Committee would have two tasks:

The first would be purely informational; it would act as an educational watchtower announcing danger when it saw it approaching. The members would keep under continuous scrutiny, and periodically report on the state of American education. Does it meet the needs of our times? Is it competitive with education in countries at similar levels of culture and technology with whom we compete economically, politically, or militarily? How do American children compare in academic knowledge with children in Europe or Russia, say at age 12, or 16, or 18; taking, of course, into consideration different ability levels?

The Committee's second task would be to formulate a national scholastic standard on the basis of its findings; a standard which would make us internationally competitive and would also respond to our specific domestic needs. The Committee would do this by means of examinations set at different ability levels. No one would have to take them, but those who passed would receive national accreditation. The Committee would in no way interfere with established institutions now granting diplomas or degrees. It would simply set up a higher standard, offer it to anyone who wished to meet it, and certify those who had successfully done so.

Neither the Committee's informational nor its standard setting function would represent a radical departure from established practice. Many federal agencies collect and distribute information. We need a disinterested agency to tell us the unvarnished truth about the true state of American education. The Committee would help prevent complacency and illusions of superiority and thus save us from the kind of painful shocks that Sputnik and other evidence of Russian scientific proficiency have given us in the past few years. There is precedent, too, for the Committee's setting of permissive national standards. We have something very like it in the 1961 amendment to the 1956 Water Pollution Act.

This amendment authorizes the federal government--if so requested by a state--to research and develop new methods of pollution control and to award grants-in-aid to localities and states wishing to use these federally established methods. In principle, you have here a national standard very much like the scholastic standard of the proposed Committee, in that it is not imposed but merely offered as a service on a take it or leave it basis.

Water pollution and mediocre education have this in common: they are problems that cannot be solved by local and state authorities alone but require some assistance from the federal government. Population growth threatens us with a severe water shortage unless we devise better means to preserve the quality of our water resources so that they may be used over and over again. Pollution abatement has therefore become a national problem and we accept a new kind of federal aid. I believe improvement of the quality of American education is at least as pressing as the need for an assured supply of clean water. "Education," say the Ford Foundation report for 1959, "is now the indispensable medium for survival and progress." Education is so basic to the quality of our national life that by steering it in the right direction we can change America's future; we can make it secure. To steer it right, I believe we need a new kind of federal aid--the kind of aid that the proposed National Standards Committee would offer.

I hope I may convince you that it would be entirely proper and extremely useful for us to have such an agency. Let me make it crystal clear that nothing in my proposal would violate the constitutional separation of power between federal and state governments, nor go counter to our tradition of control of schools by the local community. I envisage the rendering of a service, not regulation in any way, shape or manner. The proposed Committee would not usurp the functions of any existing institution.

Its job would be to draw up national examinations going deeply into a candidate's true knowledge and intellectual caliber--not IBM graded multiple choice tests. I suggested to the Appropriations Committee that we might well model them on the English national examinations which come at three levels and which offer many subject tests. Students choose the number of subjects and the level at which they wish to be examined. This is marked on their certificate which will list their so-called "passes."

Our Committee might provide one set examinations at the level appropriate for a high school graduate who aspires to enter a first-rate college; another set of examinations at the level of students who may wish to prepare for a semiprofessional or technician's job not requiring a bachelor degree but still requiring a good high school education. Still another for graduates of various types of colleges, especially those bound for the teaching profession. I stress again that no one would need to take these examinations; but those who did pass them successfully would obtain national certification; perhaps the notation N. S.--National Scholar--stamped on their regular diplomas or degrees. The seal would clearly indicate what the holder had achieved. There are many occasions when admissions officers of higher educational institutions or prospective employers have a valid reason for wanting to know what an applicant's scholastic qualifications actually are. Think how much time and money would be saved if the diploma were clearly to indicate this! Everywhere abroad it is taken for granted that academic degrees conform to a specific standard--a standard known to everyone. Setting the standard is not regarded as government intrusion or tyranny but as a welcome service to students, their parents and the taxpayers who pay for public education.

Everyone benefits when there is a standard. At one stroke it does away with misleading educational labels so that any layman has the means to judge whether a school or college is doing its job properly. By offering the reward of a certified diploma to our children many who now drift through school would be encouraged to aspire to higher academic goals. You can't expect children to study hard subjects such as mathematics, science and languages when next door others are effortlessly accumulating equal credits by easy life-adjustment courses in "Family Life." It surely isn't "undemocratic" to reward those who exert themselves with a diploma that takes note of their accomplishments. This is what certification by a National Standards Committee would do.

There is no question in my mind that a large sector of the American people wants better education. Public interest has grown tremendously. In the recent primaries for election of a superintendent of the Los Angeles schools there was almost as great a voter turnout as in the primaries for governor of California. The news media now give much more space to educational matters than was the case but a few years ago. Every time I speak or write on education I receive a tremendous number of letters.

What strikes me in these letters is the sense of individual helplessness they reflect. Individually, my correspondents have long known that education must be drastically reformed but they don't know how to induce government to act. The very size of our nation alienates government from the individual and accounts for much of the apathy for which the people are frequently castigated. Yet so often they can find no one in government to supply the leadership that is needed to carry out their wishes. Expecially when this requires tackling, on the local and on the national level, so powerful a lobby as our educational establishment. People like myself can try to bring the truth to the public so that it may be able to reach a consensus--and this I believe has now been accomplished. Enough people want school reform to warrant government action.

I think this country has reached a stage where public education calls for a partnership of local, state and federal authorities, each having its particular service to offer. Any determined reform effort--be it at the local or state level--would in my opinion be greatly helped if we had a National Standards Committee. The permissive character of the Committee's activities would introduce into public education a needed element of choice. It would leave untouched the status quo for those who are content with it. At the same time it would provide facilities for people who prefer to set themselves a scholastic standard well above current achievement levels.

The Spanish philosopher Ortega y Gasset once wrote a book around the thesis--to quote him--that "there is no doubt the most radical division it is possible to make of humanity is that which splits it into two classes of creatures: those who make great demands on themselves, piling up difficulties and duties; and those who demand nothing special of themselves, but for whom to live is to be every moment what they already are." I read this as a young man and it impressed me deeply. And all my life I have unconsciously judged people and institutions by whether or not they set themselves a standard; whether they measure themselves against a criterion that requires effort because they deem it worthy of effort.

Let us in education as in everything else heed Jefferson's advice, to "dream of an aristocracy of achievement arising out of a democracy of opportunity."

Since my appearance here is under the auspices of the Greater Grand Rapids Chamber of Commerce, and since your mission is the welfare of this community, I would like to take a few more minutes and relate what I have said to a major problem which I believe faces you.

Let me give you the gist of an address by Dr. Lloyd Berkner at the Franklin Institute in January of this year.

Dr. Berkner who is President of the Graduate Research Center of Southwest in Dallas, Texas, brought out a fact that is not yet widely understood: that today the greatest source of wealth for any nation, any community is educated brain power.

In the past, wealth was derived from the application of labor to basic resources. But the science of today has created a new source of wealth--innovations derived from science and technology created by brain power. Brain power, then, becomes the resource upon which our nation, as well as Michigan and Grand Rapids must depend for future economic and social health.

For example, a chicken factory can now produce 100,000 fowls with three or four workers, and the same efficiency is expanding to products of wheat and corn, to beef and pork. The number of agricultural workers dropped 2.6 million, or 37 percent in the last decade.

So in the 1960's our society finds itself plunged into a new social environment to which it must suddenly readjust. This readjustment requires a far greater emphasis at the boundaries of knowledge. No longer are labor, land or supply of raw materials and water the central concerns in locating a large plant. Instead, accessibility to brain power takes first place.

The creation of new industry, new products and devices, now arise from the creative and imaginative insights of these scientific and technological leaders who have access to the very limits of knowledge. Without this top skill for innovation, men of lesser skill will lose their opportunity.

As Dr. Berkner showed, no training of numbers at the trade school, high school or college level, can in itself capture the new technology. What we need is men on the Ph.D. level. For each Ph.D. available to us, we can employ five to ten engineers, and for each engineer, ten to 15 skilled workers. Indeed, in the future, we may have to count 100 or more unemployed for each Ph.D. we fail to educate.

At the Governors' Conference at Minneapolis in March 1962, Governor Andersen pointed out that the science oriented industry derived from new technology had grown from less than two million dollars annually in 1950 to 770 million dollars annually in 1961, to become one of Minnesota's principal sources of endeavor. This is graphic demonstration of the power of the new technology. In a mere 11 years, intellectual leadership had created employment for nearly 100,000 Minnesotans, representing the welfare of nearly a half million persons. But even with this remarkable performance, Minnesota is producing only one fourth of the highly trained leaders needed to develop her requisite industrial base.

What is the relevance of all this to you? I find the following statistics on public schools for 1961:

> Michigan stood 12 among the states in the number of high school graduates as a percentage of their eighth grade enrollment; 21 in the percentage of Selective Service Registrants failing the mental test; 45 among the states in the percentage of elementary school classroom teachers with less than standard certificates; and 17 in the percentage of secondary school teachers with less than standard certificates.

I know it is difficult to compare educational excellence among states and that the statistics I have cited are not conclusive. Yet they do indicate there is room for improvement in Michigan's public schools.

Would not the simple expedient of a national standard help you to find out exactly where you do stand? Would it not help you decide whether you are getting the results you should for the large sums you are spending on education, and so point the way to necessary remedial measures?

For if the public schools fail in their purpose it will not be possible to develop in adequate number the brain power and consequent innovation on which you must depend for your major capital development in the future--on the development which this community must depen for opportunity, employment and happiness.

MAY 1963

THE TALENTED MIND--OPPORTUNITY AND OBLIGATION

H. G. Rickover

Looking at the bright faces of the young men and women whose scholastic achievements we honor today, the thought uppermost in my mind is: how fortunate you are! Fortunate in that God has blessed you with a priceless gift; giving you the most lasting, the most persistently satisfying, the most all-around useful of natural endowments--a really good mind. Will you recognize the immense opportunity vouchsaved you because of that gift? Will you take full advantage of the wide choice it opens up for you in shaping your lives? Are you aware that talent such as yours imposes obligations; that you will not obtain the satisfaction of fulfilling yourselves unless you meet these obligations.

Children of wealthy parents are said to be born with a silver spoon in their mouth. I would say, you

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have been born with a platinum spoon. A good mind is rarer than a full bank account. It offers more opportunities for a happy and successful life; it is the most secure of all possessions; it cannot be taken from you.

All the same, I sincerely hope you will not be prideful of your intellectual endowments. They reflect no particular credit on you; you were given them, as other children are given different types of minds. You just happen to have been lucky in life's lottery.

Like all natural assets, intelligence is a potential, not an actual treasure. By itself it does not automatically guarantee success in life. It is potentially your greatest personal asset; but luck plays a part in whether your innate endowment can come to full fruition.

A good mind may be compared to a vein of precious metal embedded in rock. If it is to be of value, it must first be recognized, then laboriously brought forth and carefully worked over. Do you suppose Einstein would have achieved the scientific formula that changed our concept of the universe if, instead of being the child of Europeans, growing up in a scientifically advanced society that spots genius early and cultivates it assiduously, he had been born among Australian aborigines?

Geography has much to do with the development of human talent. This is why I feel so strongly that we should have a national scholastic standard in our country--a permissive one of course, given our form of government--so that local communities would have a yardstick to measure their schools and hold them to scholastic levels as high as those of schools in other sections of the country. The mere existence of a national standard in education would eliminate much of the element of chance in the realization of the intellectual endowments of America's children. We have far more geographic inequality of educational opportunities than other advanced democracies. Surely, anything we can do to diminish the part luck plays in developing the wealth of talent we possess makes practical sense; it also accords with our commitment to equality of opportunity.

What we cannot do, of course, is insure that every bright child is motivated to develop his mind. This requires long and sustained effort on his part. It is as true today as a hundred years ago that, to quote Elizabeth Barrett Browning, "knowledge by suffering entereth." We cannot spare our children the labor of becoming educated. No machine, no gimmick, can relieve them of the necessary exertions. Often we glibly assume that just as machines can be devised to take on the world's hard physical labor and boring routine chores, so can we shift the burden of learning--and of teaching--to mechanical gadgets. It simply cannot be done.

Motivation is partly a matter of native endowment, partly one of education and environment. Einstein might not have done anything worthwhile with his fine mind, if by temperament he had been lazy, or timidly conformist, or if a bad home background had led him into delinquency. Paganini might not have become the supreme violinist he was, if he had never seen a violin or never received the instruction or done the practicing required to develop his talent.

You are here today because you have taken the first step toward developing your intellectual assets; you have given your mind what it most needs--exercise in meeting diverse and difficult challenges. That you made this choice instead of just coasting along in school, having an easy time of it, you surely owe in part to the advice, aid and support given you by devoted adults--parents, teachers, perhaps someone who merely happened to be present at a decisive moment and who influenced your decision to choose a road that may take you into the realm of really advanced learning. You may take pride in that you have not buried your talent. I hope you will also be duly grateful that all the chance elements that open up a career in the realm of the intellect have come out right for you.

So far you have gone only a little way on a long road. It is steep and rock strewn; at times you may be tempted to abandon it. There *are* easier ways of life and many of them offer higher material rewards. But if you choose them, you will, in the end, be left with a sense of deep inner dissatisfaction. People are happiest when they fulfill themselves at the highest level within their reach. I urge that you let nothing deflect you from climbing onward until you have realized your full potentialities and are ready to put them to use for your own benefit, for your community and for your country.

A great advantage of pursuing a career in the learned professions or in the higher reaches of the academic disciplines is that success depends almost exclusively on what you as an individual accomplish. Here is one area of life where merit really counts for more than position, personal background and connections, or the favor of powerful men. You are truly on your own. Moreover, you need not harm others in order to succeed. There are many occupations where a man may have to decide between personal benefit and the public good; happily, you are most unlikely to be faced with this choice. If you are good in your chosen career, what benefits you will almost always benefit your fellow man and your country as well.

America is in great need of the services of its talented youth. In government, in industry, in every major field of human activity there is crying need for highly educated persons with above average minds--all the way from trained technicians, through the learned professions, to highest level scholars working at the frontiers of knowledge. Such people are desperately needed yet in short supply; without them our complex society cannot function properly. This is evident to anyone who gives the matter thought.

Not so evident to the general public is the role educated brain power can play in helping offset the loss of many of the unique advantages we once possessed and on which the Founding Fathers counted to insure the success of American democracy.

We started our life as an independent nation under the most favorable of circumstances. Among our blessings were vast resources in unclaimed land and mineral wealth, scarcity of people, de facto equality among nearly all citizens, geographic isolation from the trouble spots of the world. When we had these advantages, we took them for granted. We hardly noticed as one by one they disappeared. To the Founding Fathers their importance for the success of democracy was evident. They never expected we should lose them in so short a time.

Jefferson, for instance, believed there would be free land for many generations to come, and we would remain a country of independent farmers, artisans and merchants. Beholden to no master, Americans would know how to exercise the duties of democratic citizenship; possessing property themselves, they would know how to manage public affairs with sober skill. Political equality would be assured by availability of free land, since this would equalize wealth. The Founding Fathers counted on geographic distance to keep us out of Europe's wars and safe from foreign invasion.

Today, alas, nine out of ten Americans work for others; seven out of ten live in crowded cities or suburbs; we have a greater gap in wealth than many other Western nations. Saddest of all, the sense of personal worth and dignity has become difficult to retain. Earlier Americans possessed this to an extraordinary degree, because they knew they were needed; many present-day Americans face the constant threat of being replaced by machines.

The nation, too, has lost something of its former sense of security; the oceans that once guarded us have now turned into avenues of attack. Technology has destroyed our political isolation and the independence of action it gave. Our profligacy has hastened the end of economic self-sufficiency. As recently as 50 years ago we still had a surplus of raw materials; we then exported 15 percent of our production. Today we must import ten percent of the raw materials we need. The turning point occurred at mid-century when we began to become dependent on world markets.

From a scarcely populated, fabulously resources-rich country 185 years ago we have changed to a densely populated, resources-poor country today. We are, of course, not as poor in resources nor as heavily populated as most of the industrial powers of the world. We are still rich compared to such countries as Britain or Italy. In fact, with but ten percent of the population of the free world and eight percent of its land area, we consume close to half the free world's volume of materials. These figures are frequently used to show we have the highest standard of living in the world. What is more significant is that they also indicate our increasing dependence on foreign countries for vitally needed minerals and fuels. At present, we are truly independent only in two metals: molybdenum and magnesium. When measured against our wealth of but a few short years ago, we are therefore poor, and poorer still when measured against our future needs.

The shrinking of the once broad materials base of our industrial civilization makes us, for the first time, dependent on foreign countries for materials basic to our technical organization. So far we have had no difficulty buying what we need abroad. We may, indeed, never have to face the disaster which threatened Europe's economic life when some years ago the flow of Middle East oil was cut off for political reasons. But it would not be wise to count on this.

Dependence on imports of indispensable raw materials compels us to compete in world markets, since we must pay for imports with money earned by exports. This diminishes our economic independence. Industrial practices that suit us, but raise the cost of American goods above those of other highly advanced countries, may have to be altered. Can we forever afford a wage and salary scale greatly higher than that of Europe? Now that the Common Market has become a flourishing reality, the advantage we once possessed of having the largest domestic consumer market--which made mass production possible here while most of our competitors had too small a market to do likewise--this advantage is gone. For the first time we must worry about a drain on our gold reserves.

Let me show you how the loss of some of these once uniquely American advantages can be offset through the efforts of men of high intellect and rigorous education. Take our dependence on raw material imports.

Brain power applied to this problem can devise ways of extracting at reasonable cost the considerable store of low grade minerals and fuels still remaining to us, but which we are not utilizing because of high cost in time and labor--thus taconite and shale oil may in time make up for the threatened deficit in high grade ores and oil.

Brain power may discover ways of replacing scarce materials with plentiful materials heretofore unusable, as aluminum is now replacing copper. Trained minds may be able to relieve shortages of natural minerals and fuels by creating substitutes, as plastics and synthetic rubber have reduced our dependence on imported tin and natural rubber, or as atomic power may replace coal and oil. Similarly, synthetic products made from renewable resources may serve as substitutes for irreplaceable materials.

Probably we need brain power most to teach us the folly of needlessly wasting the inheritance of our posterity. Using nonrenewable materials is like using capital instead of living on earnings or interest. No matter how slowly capital is depleted, the day must come when nothing will be left. For almost two centuries we have been wasteful because we foolishly imagined our natural resources to be inexhaustible.

It will take wise and intelligent guidance to change our ways. Eventually we may learn to deny ourselves today's pleasures for the sake of leaving enough for our children so they too may enjoy the blessings of civilized living. We may even learn to deny ourselves such agreeable luxuries as large, chrome-trimmed cars, powered by high-octane gas which discharges thousands of tons of scarce and irreplaceable lead into the air. Changes in national outlook such as these can only be pioneered by people whose minds can grasp the scientific problems involved, and who can make the average citizen understand them.

A truism needing no elaboration is that as a society becomes technologically more complex, it needs proportionately more, as well as qualitatively better, trained professionals. Thus, while the population of the United States doubled in the last 50 years, the number of professional men and women quadrupled. We have today five times more engineers and ten times more scientists than half a century ago, yet there are still not enough. To increase our national product by a given percentage annually we must increase our scientific and engineering personnel almost twice as fast. Every step forward in technological progress makes the nation more dependent on trained brain power.

Or take the soul-destroying problem of chronic unemployment that hangs over many people whose endowments are average or below; who therefore, in many cases, can be replaced by machines. You are fortunate in that the kind of thinking you are capable of, hence the kind of contribution you are able to make, cannot be duplicated by a mechanical robot. You are, moreover, able to alleviate technological unemployment by creating new industries, and hence new jobs. Let me give you the gist of an address by Dr. Lloyd Berkner, President of the Graduate Research Center of the Southwest in Dallas, Texas, which is most illuminating on this point. The speech--called, THE TECHNOLOGICAL REVOLUTION OF TODAY: ITS IMPACT ON SOCIETY--was given last January at the Franklin Institute.

Dr. Berkner brings out the immensely important fact that today the greatest source of wealth of any nation is educated brain power. In the past, wealth was derived from the application of labor to basic resources. But the science of today has created a new source of wealth--innovations derived from science, and new technologies created by brain power.

Given our explosive population growth and the strong and seemingly irreversible trend toward automation, the problem of finding jobs for all Americans appears insoluble within the existing framework of production and service. Dr. Berkner shows that enlargement of employment opportunities depends on the creation of new industry. As he puts it: "No longer can mere labor applied to natural resources enlarge our product market. An intervening ingredient--brain power--must be available to provide the innovation that can expand our economy into new products and services. So brain power becomes the resource upon which our nation must depend for its future economic and social health." He notes in particular that "Brain power has become the principal source of future welfare of the 100 great metropolitan areas that soon will contain the bulk of the American population."

What may surprise most Americans is that every scientist and engineer trained up to Ph.D. level is now a source of employment for many others. As a rough calculation, for each Ph.D. we can employ five to ten engineers, and for each engineer we can use ten to 15 skilled workers. Dr. Berkner goes on to say: "But the creation of new industry, new products and devices, new methods and applications from the new technology arises from the creative and imaginative insights of scientific and technological leaders who have access to the very limits of knowledge. Without that flavor of top skill for real innovation, men of lesser skills will lose their opportunity.....in the future we may have to count 100 or more unemployed for each Ph.D. we fail to educate."

In the light of these facts, we should be deeply concerned that despite all the money spent on education we do not produce a sufficient number of Ph.D.'s; on a per capita basis we barely produce as many Ph.D.'s as most European countries. If we count only those of our Ph.D.'s that are truly comparable scholastically to European Ph.D.'s, we find that we definitely lag behind. This is one reason why we import so many foreign Ph.D.'s, to the chagrin and anger of countries that have spent much public money to educate them.

Apart from these specific contributions toward making ours a viable, smoothly functioning, steadily advancing economy, educated brain power can help the American people to a better understanding of the new science and technology that so deeply affects all our lives. Technology, that is the utilization of science for practical purposes, has such enormous potential for the good or evil of man and society that how we use it requires careful rethinking. We have here a complex problem that calls for a higher order of intelligence than has so far been applied; we have left it almost entirely to the management of practical men.

With due respect to the accomplishments of practical men, to whom we owe our material comforts and luxuries, I believe one can fairly say the practical approach to a new scientific discovery is narrow, short-range and private; it is concerned with ways to put the discovery to use in the most economical and efficient manner, little thought being given to side effects and future consequences. The intellectual approach--if I may use this term--is broad, long-range and public; it looks to the effects which the use of a new discovery may have on people in general, on the nation, perhaps on the world; present and future.

I can best illustrate what I want to bring out by a simple example. Commercial deep-sea fishing can be done so efficiently with modern techniques that a relatively few enterprises could rapidly sweep the oceans free of commercial fish and whales. Left to themselves, this is what the fishermen of all nationalities would do. As practical men they are interested only in how new technology will increase their catch, preserve it and get it speedily to market. They have been ingenious in pursuing this short-range private objective. Figuratively speaking, the world's marine scholars have stood by wringing their hands at this "practical" folly. To them it has been incomprehensible that reasonable human beings should fail to see that in the end far more can be taken from the sea if fishing conforms to sensible conservation regulations permitting the species to reproduce itself.

Conservation has had hard sledding in this country. We have a predilection for believing practical men when they assure us our resources are unlimited, and to pooh-pooh the warnings of scholars and conservationists as coming from ivy-tower eggheads.

Half a century ago, Theodore Roosevelt's drive for scientific forest management was laughed out of court by practical lumbermen who assured us our virgin forest stands were inexhaustible. We are still far behind Europe in conserving forests; we still waste timber needlessly. Yet consider how important a tree is, besides furnishing wood when it is felled. Its roots hold the topsoil and prevent it from washing to the sea; they help slow the downflow of torrential rains, thus diminishing the danger of floods; they build up our water tables. Many trees, so writes human ecologist S. P. R. Charter in a book just off the press, "in adding one pound to their weight, use and discharge into the atmosphere approximately 35 gallons of clean water. By comparison, a pound of steel uses some 20 gallons of water in its manufacture; a pound of rayon use some 180 gallons.....Much of this industrial water is not re-usable. *How many pounds of tree does a human need in his lifetime, for his body and his spirit?*"* (italics mine)

These are not purely academic questions for present-day Americans. Many of us already live in areas having intermittent water shortages. We have as yet no *practical* means that will guarantee availability of enough cheap clean water a decade or so from now when we shall urgently need new sources of supply. It is estimated that merely to remedy existing municipal and industrial water pollution would cost the American taxpayer twelve billion

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**Man on Earth*, Contact Editions, Sausalito, Cal., (1962), P. 30.

dollars, besides large additional sums to keep our lakes and rivers clean thereafter.*

Thoughtful Americans are calling attention to the fact that nature, if abused, will strike back. We are beginning to perceive that activities which in the past could be safely left to practical men making private decisions now involve such complex relationships and such potentially dangerous consequences that we need to take counsel with our men of science, our scholars in the humanities, with our country's most highly trained intellects. What these contribute is a deep understanding of man and of nature; they look upon technology from a broader, more humanly oriented viewpoint. Those who have studied particular aspects of nature are far more knowledgeable in this field than most practical men. A plant biologist knows a great deal about pesticides even though he has never had to meet a payroll! We need all the intelligence and all the expert advice we can muster merely to understand the problems science and technology create, let alone to solve them in a manner that will preserve our free way of life.

Not only in technology but in other areas of life as well we depend increasingly on people with trained minds. Most of the big and vexing problems with which we grapple today are of a kind that such people alone can hope to solve. The simpler, practical problems that occupied much of our thinking in the past are well on the way to a satisfactory solution.

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*_Ibid_.

Thus we know how to produce immense amounts of attractive consumer goods, but we don't know how to create enough purchasing power within our free enterprise system to get them off the shelves.

We know how to obtain large crops from our land but not how to protect ourselves against careless use of dangerous pesticides and weed killers.

We are marvelously ingenious in harnessing water power but helpless in preventing pollution of our rivers and lakes which makes them poisonous for fish and useless for recreation, not to mention the resultant deterioration in the quality of our drinking water.

We have learned how to launch satellites into space but not how to protect our once gloriously beautiful land against relentless commercial depredation which creates landscapes as ugly as anything our astronauts will find on dead moons or planets.

We know how to produce and distribute gadgets galore for artificial recreation, but not how to provide our children with a natural environment where they can play in safety; we can't even guard our remaining national wilderness areas against the insistent demand of those who would appropriate them for industrial use. No nature lover can help being heartsick that something so rare and beautiful as Indiana sand dunes ~~are~~ is being bulldozed off the earth.

We need courageous men who will strive to preserve a bit of nature for future Americans, but the pressures are strong against those who think in terms of the needs of generations to come, not just of present-day desires for quick benefits.

Though you will presumably choose scientific careers, I hope you will concern yourselves with unsolved problems such as these. You have the capacity to contribute to the resolution of all sorts of public issues that, strictly speaking, are not within your area of specialization. A good mind, liberally educated by formal schooling or through self-education, can be profitably applied to solving any problem that calls for analysis, clarity of thought and logical reasoning. It is your right and your privilege as citizens of a democracy to participate in shaping your country's destiny; to contribute your efforts to the betterment of society and the strengthening of the nation. Do not become discouraged by those who argue that good though a man be as a scientist, when he concerns himself with problems outside his profession, he is no more competent than the average citizen. This is one of those superfically persuasive half-truths repeated so often that they assume the sanctity of dogma.

Persons of modest endowment and undistinguished education rightly feel that whatever competence they may have lies exclusively in the career for which they have been specially trained; they err when they assert that the same holds true for everyone. The ability to apply oneself to a broad range of problems and catholicity of interests is precisely what distinguishes the person of exceptional intelligence from the average man. To be sure, intelligent people may be stupid in some things. As I stressed earlier, a good mind is a *potential*, not an *actual* treasure. The brightest person must apply himself assiduously in order to contribute to the solution of a problem new to him.

Given the importance of the contributions trained brain power makes to our society, we have been surprisingly reluctant to respect intelligence, to give it its just due. In the past, there was good reason to admire human qualities other than pure intellect. During the first 300 years of our history the rough work that had to be done to make this continent habitable for civilized people absorbed all our energies. This kind of work had long since been completed abroad, and Europe had gone on from there to build a civilization which put great stress on cultivating human talent.

The settlers who crossed the Atlantic moved back a thousand years into the past to take on the conquest of a wilderness--just as their forebears had to conquer the wilderness that covered Northern Europe at the time of the Fall of Rome. Meanwhile Europe, having conquered her own wilderness proceeded to produce literary and artistic work of great merit; to create splendid educational facilities; to make all the basic scientific discoveries on which the Industrial and the new Scientific Revolution rests; and to take great strides technologically.

Until we got our own rough work done and caught up with Europe culturally, there was bound to be a great difference in the kind of human qualities most valued here and abroad, hence of the kind of people for whom either America or Europe was the land of opportunity. This difference in value of human qualities has caused much misunderstanding and consequent antagonism.

It is well to keep in mind that it was not because of some sort of magic in American life that, by merely moving from Europe to America, a man could increase his wages for the very same work. The reason was simply that here men were scarce and ordinary labor was greatly needed, while in Europe there were more laborers than jobs.

America was, in turn, a land of dazzling opportunity for men and women whose intellectual and educational attainments might be modest, but who had the stout hearts and strong arms most needed during pioneering days. Then, when the Industrial Revolution belatedly reached our shores, it was practical men who came into their own; men adept at taking the products of European inventiveness and putting them to use in ways that suited the special kind of life in this new raw country; where people were scarce, hence valuable, while land and natural resources were abundant, hence expendable. Impatient for quick profits, these practical men proceeded to exploit our resources with ruthless efficiency, building a fabulously productive economy, though at the cost of great waste of irreplaceable natural wealth. No one minded the waste; Americans were intoxicated with material affluence and admired the men who created it for them.

Now that our once abundant natural wealth has shrunk and our once scanty population has soared, we are becoming more like Europe in the social, political and economic problems we face and the kind of human competencies we urgently need. Sputnik scared us to re-evaluate and reverse our traditional contempt for intellectuals--for scientists at least. It is to be hoped we will not wait too long before we shed anti-intellectualism entirely. Scholars in the humanities are as valuable, if not more so, to a civilized modern country as scientists, engineers and physicians, or, for that matter, artists and writers. It makes no sense at our level of civilization to indulge in hostility toward what are scornfully called intellectual "elites."

No modern nation can affort to let talent go to waste. It makes no sense to close our eyes to the fact that, at least at the secondary level, bright youngsters need separate schooling. They need different, more demanding curricula and far more intelligent and more highly educated teachers if they are to be accorded true educational equality; that is, schooling that serves their own peculiar needs as adequately as schooling of a different kind will suit children with nonacademic minds.

Alone among advanced democracies, we cling to the concept of a 12 year comprehensive school which robs our talented youth of three to four of their best learning years. I will not delve into the motives that perpetuate this incredible folly, but at bottom I think one would find an unintelligent and confused misconception of democracy that confounds political and intellectual equality.

When I first pleaded for recognition of the needs of talented children, I was accused of foisting an "un-American," "aristocratic," "elite" education on our hapless youth, of wishing to "educate the best and shoot the rest," and similar nonsense. I have no power to foist anything on anybody, but surely I have as much right to advocate good basic education as the lovers of the progressive philosophy have of advocating life-adjustment and similar stuff. They are the ones who have foisted their brand of schooling on our children without--to my knowledge--ever obtaining a mandate from the American people.

Equality of opportunity is a splendid thing that we have always and will always cherish. But downgrading everyone to a mediocre level in order that no one will feel slighted is maudlin egalitarianism and in a deep sense un-American. The Founding Fathers clearly distinguished between political and intellectual equality. Jefferson urged that "we dream of an aristocracy of achievement arising out of a democracy of opportunity." Another signer of the Declaration of Independence, John Adams, wrote to John Taylor: "That all men are born to equal rights is clear. Every being has a right to his own, as moral, as sacred, as any other has.......But to teach that all men are born to equal powers and faculties.....is as gross a fraud, as glaring an imposition on the credulity of the people, as ever was practiced.....For honor's sake.....for truth and virtue's sake, let American philosophers and politicians despise it."

I have devoted this speech to talented youth because the subject seemed appropriate to the occasion. I would not like to be understood as being interested only in bright children and their need for a good education. All children need the very best schooling we can devise for them. What they are getting today falls far short of this aim. It is time to reassess what we have been doing to the future of America by neglecting to remedy this situation. I have found it humiliating that my studies showed quite small and poor countries providing better schooling than we.

Currently a lot of experimenting with all sorts of gimmicks is going on--including teaching machines based on experiments with pigeons and rats!--and we are constantly being told that the schools are now vastly improved. Yet the two basic reforms that alone will make us competitive in education with other advanced countries have not been carried through.

I have mentioned the necessity of providing separate secondary schools for different levels of academic aptitude and educational aims. All European democracies have these in their free school systems; only we keep calling this "undemocratic."

The other essential reform has to do with a complete reversal of the position of the American teacher. The teacher is the pivot on which the whole educational effort rests. As I have said so many times, we must raise teacher qualifications as well as rewards, so as to attract high caliber people into this all important profession. And we must put the school system in charge of the teachers, supplying them with the necessary clerical and administrative personnel. All European democracies have teacher-run school systems. That is why they are so good.

Let me in conclusion wish you the best of luck, and urge you to make your life an adventure of the mind. This will at times be hard, but always deeply rewarding. When you reap the fruits of your own intellectual labor you will experience the satisfaction of having proved yourselves good cultivators of the talents given you by Providence. Over and above all this, you will know that yours is a kind of pioneering which yields not alone personal gain and satisfaction, but also contributes significantly to the economic, hence the political strength and security of our country. This you will find the greatest reward of all.

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THE PURPOSE OF EDUCATION

by
Admiral H. G. Rickover, U. S. Navy
at a Meeting of the
Chamber of Commerce of Reading and Berks County
at Reading, Pennsylvania
May 27, 1976

I will speak on the condition of public education in the United States. My concern is with the purpose of education and the role it should play in society.

Since the ancient Greeks, men have affirmed that to be educated was to be made better. The Emerald, a book first compiled by a fourteenth-century Russian from Greek materials, argued that ignorance was worse than sin. A young Norwegian of the thirteenth century received this advice from his father: "Remember this, that whenever you have an hour to spare you should give thought to your studies, for it is clear that those who gain knowledge from books have keener wits than others, since those who are the most learned have the best proofs for their knowledge."

The papal charter of the University of Basle, founded in 1459, speaks of the hard and persistent labor by which students may obtain "the pearl of scientific knowledge" and with it "one of the greatest happinesses accorded mortal man by the grace of God." This pearl is

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the key to a good and happy life. It "bestows its favors on the untaught and raises to the heights men born in the lowliest circumstances, for as learned men they are placed far above all who are unlearned, indeed made alike to God."

What does it mean to be educated? First, it means to have knowledge of the world around us, to know history, literature, philosophy, and science. Second, it means to possess skills such as the ability to read, to write clearly, and to calculate, which make a person a useful member of society. Third, and most important, it means to be able to think critically and logically.

The purpose of education is to instill these attributes in people. To accomplish this, the overwhelming concern of the school must be with the intellect; preoccupation with anything else increases the probability that the goal will not be met.

Unfortunately, our educational system is not up to the task. Every year I interview several hundred midshipmen from the Naval Academy and officer candidates from most of the better colleges and universities. These interviews give me an insight into the kind of education our better students have received in sixteen years of schooling.

Those chosen for the nuclear power program are sent to special schools where they are given a tough course in nuclear technology and in more basic subjects such as mathematics, physics, and electrical engineering. The curriculum for these schools is prepared in my office in Washington. Over 5,000 officers have successfully completed this course of study. In addition, over 29,000 enlisted have completed a similar but more basic course.

Educated people are needed to develop and work with nuclear power. But I know from student performance in our nuclear power schools, and from the interviews, that few graduates of American schools and colleges are well educated. In digging into the reasons why this is so, I have been convinced that the American educational system is doing a poor job of training young minds to think clearly, logically, and independently.

Part of the blame lies in the lack of purpose in our schools. For many years, and with few exceptions, public elementary and secondary schools have been guided by educators imbued with the philosophy of John Dewey. Dewey claimed that "the primary business of the school is to train children in cooperative and mutually helpful living." I believe this to be an erroneous concept of education. In embracing it, educators have rejected thousands of years of thought about the purpose of education; they have also left our children poorly prepared for the dynamic, competitive society they must eventually join.

The purpose of public education has been perverted by the so-called progressive ideas of Dewey and his followers. Behavioral scientists now swell the ranks of teachers and administrators. Experimental programs absorb massive amounts of tax monies under the guise of such ambiguous names as social engineering, behavior modification, and sensitivity training. These programs do not develop children's ability to sort facts and make their own decisions. Instead, they offer material carefully prepared to indoctrinate them in favor of pre-selected attitudes.

The courses given at teachers colleges, the proceedings of recent educationist conventions, the textbooks used in many public schools, and the content of educational journals reflect this idea. Many education leaders and organizations have disavowed teaching and learning as the primary purpose of American education, pursuing instead a supposedly higher goal.

This pursuit is of many years' duration. The National Education Association's School Administrators' 25th Annual Yearbook, published in 1947, urged, "A fundamental shift of emphasis through our whole education program from helping to educate the individual in his own right to become a valuable member of society to the preparation of the individual for realization of his best self in the higher loyalty." The "Forecast for the 70's," a 1969 article which is frequently quoted in educational publications, predicted that teachers will more accurately be termed "learning clinicians," since "schools are becoming clinics, whose purpose is to provide individualized psychosocial treatment for the student."

In my opinion, "psychosocial treatment" as well as most social scientific experiments have no place in the educational system of a free society. That they are so prevalent shows that schools, consciously or otherwise, tend to be run for the benefit of teachers and administrators; not for the benefit of the students they are paid to serve. This belief is reinforced by the defiance with which parents and employers, who must deal daily with the recent semi-literate graduates of our schools, are met when they criticize the educational system. Education spokesmen contend that only professional educators are qualified to judge how well schools are doing their job.

That is a dangerous and shortsighted attitude. Mr. Houston Flournoy, former controller of California once said:

> "One of the most critical aspects of the current challenge to quality higher education is the all-too-common notion among faculty members and students that the public as such should keep its nose out of their business. They too frequently ignore that we

> are talking about public quality higher education. By definition, the public is involved, and, furthermore, whether the public should interfere or not, they are involved if for no more than the prosaic reason that they are being asked to pay the bill."

I suspect that most people outside of education would agree with Mr. Flournoy, and would apply his principle to public elementary and secondary schools as well.

When organizations, groups, and institutions are answerable only to themselves, their actions tend to become self-serving. This is true of public education. The public has long given teachers and administrators great leeway in running the schools; at times that leeway has resembled total neglect by the public of the direction and purpose of education. In the absence of controls, the educational establishment has found fads to be more self-serving than fundamentals. Every three years, something comes along that is supposed to improve education. But career education, counseling, compensatory education, and social engineering, all require more staff, more buildings, and especially more money. When these additions to the schools' mission detract significantly from training students in the basic skills, then I believe the public must pay urgent attention to the consequences of continuing on that course.

The results of the drift in educational thinking strike at the very basis and fabric of society. Schools are fostering attitudes in students that ill-prepare them for the harsh realities of the world. Take the idea that learning must be fun, not work. This idea is both cruel to the child and dangerous to society, for children grow up believing that they need not struggle to excel.

In order to make teaching fun, and I believe to make themselves popular, many teachers and administrators have deemphasized disciplined thought and work habits, and stressed creativity, individuality, and "feeling." What this means in teaching English, for example, is a turning away from serious reading and closely reasoned writing. Students, especially at the high school level, are led to believe that oral and written expression need no real effort. Feelings are often placed ahead of language as the primary tool of expression. In consequence, students are cheated; they do not face the difficulties inherent in good writing, and do not develop the ability to write well.

One of the truths of life is that if you want to influence others, it is not enough to know a subject; you must also be able to express what you know. That is what makes the ability to write clearly a most valuable skill. But many students simply do not value writing skill in a world they see as predominantly technical. Teachers who hold grammatical achievements in small esteem only reinforce this notion.

The "learning is fun" movement has also affected mathematics. In the late 1950's, the "new math" was hailed as a revolutionary method of teaching a subject that generations of children had found "distasteful," or "not fun." By abolishing the systematic progression from arithmetic through algebra and geometry, the new math was supposed to make it easy for children to understand and enjoy mathematics. The results were predictable. The money spent on training teachers in the new math and rewriting textbooks was largely wasted. Millions of young Americans learned something of sets, variables, and binary operations. But many failed to learn the arithmetic needed to balance checkbooks or figure income taxes, and most have a poor foundation whence to move to higher mathematics, physics, and engineering.

The official philosophy of the educational establishment is that a child should not be forced to memorize the multiplication tables. It is claimed that to do so destroys his spontaneous interest in the "joyous" process of multiplication. The educators will make multiplication joyous by doing away with rote learning and discipline. Such an idea, which pervades our elementary schools, can only hamper our technological society.

A passage in the Talmud reads: "The world is upheld by children who study." For such children, there is no easy shortcut to learning. Learning can be interesting, rewarding, and exciting, but it is not fun and games; it is work. No learning takes place, just as no ditch gets dug, without work. Mental sweat is required of the student who would master a course. Preaching the doctrine that learning should be fun implies that society has an obligation to make life easy, and encourages an antiwork attitude already far too prevalent. If what we want for our children is fun and games, then why do we need schools or teachers? We could get along just as well with playgrounds or the streets. All we would then need are some playground attendants and a few athletic coaches.

In the past few years, behaviorists and other social scientists have done much experimenting in education. Team teaching, open classrooms, and unstructured courses are some examples. The new experimental programs have a couple of points in common. Generally, their purposes are explained in jargon which is unintelligible and meaningless to the average citizen. Take libraries. They are now called such witless and imprecise names as multimedia center, resource center, learning resources center, and learning materials resource center. The jargon of systems analysis and other pseudo-sciences is used throughout the schools: instructional systems, configuration of resources, instructional systems components, task analysis, information networks, program planning, instructional development functions, operational effectiveness. If this weren't enough, some educators call history and geography "social living," while English has become "language arts."

Another common trait of the experimental programs is their high cost. Much of the expansion in school staffing has occurred not in the ranks of teachers, but through increased employment of psychologists, sociologists, and other "counselors." Further, the schools being built are often far more sumptuous and expensive than necessary because of the technical gadgetry that the educationists find vital to their work.

Much experimentation has focused on ways to give the student greater freedom of choice in course selection, or to give him greater opportunity for "creativity." The ends to which this policy is taken are absurd. One school superintendent forbade the use of coloring books on the grounds that they force pupils to confine their artistic efforts within fixed, identifiable lines. Another superintendent felt that since children were permitted to be creative at home, they should be allowed to be creative at school. The resultant milling around of children in the schools led to chaos. This was a predictable result since most children are not competent to decide what is in their own best interest or how much creative freedom they should enjoy.

Sumptuous buildings and experimental programs do not make students educated. Children could be taught in a barn if the teacher were competent and a learning atmosphere were encouraged. Still, in the past few years, hundreds of millions of dollars in educational research has been done in an effort to replace teaching concepts thousands of years old. I do not believe this research, or the millions it cost, has made students any better educated today than those of twenty years ago. On the contrary, to the detriment of our children, it has diverted attention from education's real purpose of training the mind.

Undisciplined learning and experimentation has resulted in students' increasing inability to use the English language. This is shown by college board scores on the verbal test which, over the last decade, have dropped thirteen percent. The scores in 1975 were the lowest ever recorded. The decline is confirmed by college professors who find themselves confronted with students who have limited vocabularies, who cannot make proper sentences, organize papers, or write well enough for college work.

To be sure, some of the blame can be laid to influences outside the school. For example, television has contributed greatly to the decline in the ability to read and write. According to one study, high school seniors have spent more of their young lives watching television than they have in the classroom; 15,000 hours of television versus 11,000 hours of formal school instruction. Not only do parents allow their children to become slaves to television, they reinforce the habit by watching programs with the children. Such tacit adult approbation of television's value provides children with little incentive to read for profit or pleasure.

With television, the viewer is passive. He does not have to act to absorb the message as he does in reading. Reading allows a person to stop, reflect, and then return to the text. Television is non-stop; it gives the viewer no time to think. In our complex society, each citizen needs the ability to view his world critically and dispassionately. Television does not lead to or develop critical thought the way good books do.

Then there is the question of equality in the schools. A cherished goal of American education has been to provide free education through high school to every child regardless of family background or financial status. The objective was to give each pupil an equal opportunity to earn a high school education. Those who could not keep up with the work failed, and did not receive promotion to the next grade and ultimately a diploma. At some point, the objective was changed to one of giving each pupil a diploma. In an effort to ensure that nearly all who wanted to pass could pass, the system lowered its requirements and standards. Homework was seldom stressed or required. Children advanced into the next higher grade almost automatically.

By itself, this action only affected students who were lazy, slow learners, or had limited capability. Above average students could conceivably move ahead of their peers into advanced work. But the social scientists decided it was "unfair" to separate students by ability. Ability grouping was anathema since it implied that not all students were equal. Instead, all students were to be lumped together in the classroom, a condition which produces a stifling atmosphere of mediocrity.

Children have unequal mental abilities and therefore learn at different speeds. They cannot all climb equally high on the ladder of education. Therefore, to brake the learning of talented pupils to the speed of advance of the average or less capable students is to waste their time and abilities. Our society cannot afford to waste these human resources. Since natural resources are being rapidly depleted, brain power is becoming an increasingly more valuable component of continued economic well-being. Moreover, we are in technological competition with the Soviet Union militarily, and with the entire world economically. Money alone cannot advance technology; highly developed intellects are also required. The side which excels in producing those intellects will eventually have the more advanced technology, and the benefits that it makes possible.

These principles ought to be evident to every concerned citizen. But the educational establishment prefers a sham egalitarianism, even if this results in many children being denied an education geared to training their minds as completely as possible. Lowered standards and lessened discipline may allow the mass to move forward together and to claim the same rewards, but they do not produce well-educated citizens.

One way progressive educationists have lowered standards is by tinkering with tests, grades, and other measures of performance. The trend against testing began by first discounting tests, then hiding their results, and finally abolishing them altogether. The culmination of this movement was the resolution adopted in 1972 by the National Education Association at its annual convention. The resolution said "Tests and the use of tests are a violation of human and civil rights."

That is patently absurd. Tests and grades are not intended to measure a student's value as a person, but to measure the extent of his knowledge and the quality of his work. Students, parents, and employers have a right and a need to know where students stand academically. The abolition of tests is itself a violation of that right.

Along with abolition of tests has come the end of failure. Many colleges no longer list "F's" on student transcripts. One institution graduated a student magna cum laude even though he had received 10 F's in his courses. Hundreds of schools allow students who receive a poor grade to take a course over, and then only the last grade is taken into account in computing the grade point average. Grade inflation has spread to the extent that at many colleges, three-quarters of the grades given are A's or B's. Grade inflation in high school is just as prevalent.

All of these factors have cheapened the high school diploma and the college degree to the point where their value as indicators of educational achievement is in question.

Some of the most prestigious universities are now having second thoughts about providing students with what is advertised as a liberal education without requiring of them the necessary self-discipline and hard work which such an education entails. And many students are now asking to go back to the old methods of marking because those who have studied and worked hard no longer have an advantage in seeking jobs. Hopefully, this attitude will filter down to high school and grade school levels.

But even if all of the experimentation and the tinkering with tests and grades stopped, and students took difficult, challenging courses, one more step would be needed before schools provided an excellent education. The corps of teachers needs radical upgrading before it will be able to fulfill the job of educating the young properly.

Educationists have the mistaken belief that teaching is essentially a matter of classroom management, and that how teachers manage their classes is more important than their background knowledge in a specific subject. This is a unique notion. In Europe, teachers are required to be knowledgeable of the subject matter they teach. Those teaching above the elementary level hold advanced degrees in their field. In this country, teachers colleges generally do not require specific mastery of a subject beyond passing standard courses in that subject. What is considered important, and is implemented by restrictive state laws, is how many courses the teacher took in the techniques of teaching.

Here is how a publisher of science materials for junior and senior high schools used this philosophy in advertising his product:

> "It does not require specific subject background on the part of the earth science teacher."

In other words, the teacher does not need to know much earth science in order to use these teaching materials. The problem does not end with earth science. French is taught in many high schools by those not fluent in French. English composition is taught by those who are not well versed in English. Geometry and algebra are taught by those who know little mathematics.

Not only are many teachers unknowledgeable of the subjects they teach; as a group they are intellectually inferior to other professionals. James Koerner, in his book, The Miseducation of American Teachers, cites studies showing that prospective teachers on the average exhibit the lowest academic ability of any major group in higher education. One study found that the average high school academic performance of the teacher group exceeded only that of the group which dropped out of college with failing marks. This conclusion is supported by the Educational Testing

Service which found that those taking the Graduate Record Examination in the field of education consistently make lower scores than those in any other field.

Low ability combined with second-rate training means that many teachers are not competent to teach, despite the glut of apparently qualified teachers on the market. For instance, more than half the English teachers who applied for jobs in 1973 with a suburban school system flunked a grammar test. Their most common error was the inability to identify a correct sentence. Similarly, an educational consultant reported that many teachers cannot spell better than their pupils. One need look no further than these reports to discover the reason so many high school graduates are nearly illiterate.

With all of the problems, the solution is massive reform. Unfortunately, reform is not something the educational establishment recognizes. Many education leaders still rate their performance by counting desks filled and diplomas granted, without considering what the pupils sitting at those desks or receiving those diplomas are being taught. Similarly, many teachers hide behind their supposed professionalism to dismiss suggestions that their performance is inferior.

Some educators do admit that the high school diploma no longer is as valuable a measure of educational competency as it once was.

But in the same breath they cite impressive statistics on educational achievement as in this quote from the director of the National Institute of Education: "Over half of our population now has a high school diploma which is the highest degree of educational literacy, I guess, that any country has been able to manage." You may remember the famous case where a high school graduate could not read his diploma.

The sad truth is that Americans keep every child in school almost until adulthood, regardless of whether or not he profits from school learning. In that sense, our country has managed to do more than other countries. But, in fact, the average European after ten or eleven years of school has achieved, to use the phrase, a higher "degree of educational literacy" than his American counterpart.

Teachers, like educators, share blame for this situation. Teachers like to consider themselves professionals. They are aided and abetted in this effort by teachers colleges, phony advanced degrees, and teachers unions. But, because of low ability and poor training, they really qualify only as technicians. Unlike the skilled but unionized laborer, teachers are seldom judged by output or results. An incompetent carpenter can be fired despite his union affiliation. Teachers, however, are rarely fired if students fail to learn.

Since the educational establishment has and will do everything it can to stifle reform, it will take public pressure to straighten things out. In some parts of the country, parents have successfully pressured local school districts into establishing back-to-basics alternative schools. In large part, however, parents have not succeeded in revitalizing the schools. They fail because they believe it is necessary only to present their case clearly enough and with sufficient documentary proof to provoke change. They discover too late that fact and reason alone have little to do with the problem. The issue is the power of the educational establishment to do whatever it decides.

I have no panaceas for the problem of poor education. However, I do have some basic recommendations which would go a long way toward stimulating educational excellence.

First, we need to recognize the importance of the teacher in the scheme of education. As it is now, we are indulging a national penchant for trying to create people-proof institutions. We want schools that can educate without good teachers. The often discussed Coleman report found that the characteristics of a school have little correlation with educational achievement; that the one school characteristic that does show some correlation with scholastic achievement is the intellectual attainment of the teachers. It makes sense that pupils learn more in schools where the teachers are intelligent, educated people.

To attract intelligent teachers, schools need to make teaching professional. Under the present system, many administrators and leaders of education barely tolerate scholarly pursuits. They value and require effort extraneous to the teacher's real job, such as paying dues, reading trade journals, attending workshops, and taking endless education courses. Many good prospective teachers are deterred from teaching because they recognize that such activities do not make teachers professionals.

Another need is for a realistic salary scale. Most teachers, competent or not, are paid exactly alike; seniority is usually the only differentiating factor. One way to get better teachers is to reward ability accordingly. As Koerner has said, "When a really first-rate teacher can command whatever the market will pay for his talents, as in any other profession, teaching will attract many more of the able young persons graduating from college." The military is also faced with this situation, but solves it by separating less effective officers at various points in their career.

Second, and notwithstanding this last point, there needs to be an awareness that money alone cannot and will not raise educational quality. Education in the United States is now a $120 billion a year business. But in 1974, it was reported that 1 million of the Nation's 23 million young people aged 12-17 could not read as well as the average fourth grader and were, consequently, considered illiterate. People often have the mistaken idea that education is a service to be bought. The only acceptable coin which buys an education is hard intellectual effort. Without that individual effort, no amount of money can do the job.

I believe that our children will put forth that effort if they are guided and challenged by competent, qualified teachers. Money should be used to attract such teachers. This does not mean that more total money should be spent on schools; it means we need to spend money more wisely. Our school establishment is already the most expensive in the world. We have luxurious buildings, large administrative staffs, and a surfeit of educational gadgetry. European countries spend less money per pupil than we. Yet, because they have simple, austere buildings, they are able to spend more on teachers. In my view, the most cost-effective way of improving our schools is to follow the European example.

Third, we need a national standard for education. Without a standard, there is no yardstick by which to hold teachers and administrators accountable for failing to educate our children. In fact, under the present system, parents, employers, and interested citizens have no real guide to how well the schools are educating the young until after the students leave school and try coping with the outside world. In the process of establishing a national standard for education, we would first have to determine what we want the schools to accomplish. What sort of persons would we like the young graduates to be? What kind of education would be of greatest use to them as human beings, as citizens, as breadwinners?

A national standard is feasible and need not be coercive. California and Oregon have established standards for graduating from high school. Several other states and cities are considering them. In

Europe, national standards are considered a protection for the student rather than interference by the state. Standards are drawn with infinite care by persons of solid scholarship and educational experience. While the primary purpose of a standard would be to set minimum levels of knowledge which students should attain, it will also enable local communities and parents to judge how well their own school systems are educating their children for the world, and in comparison to other communities.

Last, we need a guiding purpose to education that recognizes the singular importance of study and learning, of transmitting to each generation the accumulated knowledge, and perhaps some of the wisdom, of mankind. Maimonides, the famous Jewish philosopher of the twelfth century said that the first question on Judgment Day will be whether one fulfilled the duty of study. If schools are to encourage this view, learning must be elevated to its proper position as the primary focus for education.

To do this requires a return to basics and a rejection of social science experimentation. Anything which detracts from the central goal of imparting knowledge must be questioned, and in most cases eliminated. Most of all, schools have to realize their limitations. Today, they are attempting to carry on a vast social program rather than an educational program. In addition to those traditional teaching functions of the school, they are trying to perform the functions of social worker, parent, physician, minister, policeman, drug counselor, and employment agency. They are trying to do everything; consequently they do nothing well.

As citizens, it is our responsibility to do all we can to make it possible for the country's youngsters to get a good education. If students had no teaching machines, no buildings, counselors, or administrators, they could still learn as long as there were enough competent teachers. But if schools do not teach, then for what reason do they exist? If we are just going to have places for social contact, for maturing our young and for keeping them off the streets, the job can be done more cheaply than by having schools.

In Napoleon's army, it was said that every French soldier carried a marshal's baton in his knapsack. What this meant was that a man's advancement depended solely on his ability. Theoretically, every soldier had the opportunity to wield the marshal's baton. And, in fact, eighteen of the twenty-six men appointed marshals by Napoleon advanced from the enlisted ranks.

Our educational system must see its purpose in a similar light. Society's leaders are most often educated people, whose minds were developed from youth through disciplined study. Schools that do not stress mental discipline deny their students the kind of education that produces leaders. Moreover, each person's opportunity for becoming educated is limited. If schools do not rigorously train their students in the limited time available, the opportunity passes, and with it the options are lost.

As many of you are aware, I have been severely criticized by the educational establishment ever since I entered the education arena to express my views. You may ask what caused me to study education. When I started to interview people for the nuclear propulsion program, I was shocked to find out how poorly educated most candidates were. I had not expected them to know much about nuclear engineering, but I was surprised to find them deficient in speaking, writing, history, and philosophy. I wondered why our educational system was not meeting our needs despite the amount of money we were lavishing upon it. As a result, I studied the educational systems of ancient civilizations and European countries. I have written three books on education.

You must understand why I am so deeply concerned. In my position I have a legal responsibility for the safe operation of all the nuclear ships in the United States Navy. This is also a moral and personal responsibility I cannot and do not evade or shift to any other person or to any other organization. It was for these reasons that I made myself responsible for the selection and training of all who serve in the Nuclear Navy. Beyond this, I feel responsible for what every one of the students who graduates from my school does until he leaves the Navy. I monitor his performance, question his actions, and, if necessary, recommend his removal.

You, in this audience, do not bear nor are you expected to bear any responsibility for nuclear propulsion. You are responsible, however, for seeing to it that your children and the children of your community receive a good education. You must take on the task of giving your schools direction and purpose, and of providing them with first-rate teachers. Not to assume this responsibility is to neglect your moral and personal duty to all of our youth.

STATEMENT OF
ADMIRAL H. G. RICKOVER, U. S. NAVY
TO THE
SUBCOMMITTEE ON EDUCATION, ARTS, AND HUMANITIES
OF THE
COMMITTEE ON HUMAN RESOURCES
UNITED STATES SENATE
JULY 14, 1977

Thank you for the opportunity to present my views on American education to this distinguished Committee.

In my search for people capable of meeting the demands of the Naval Nuclear Propulsion Program, I have had a unique opportunity to judge the products of our schools. Over the last three decades, I have interviewed thousands of top graduates of our colleges and the Naval Academy in search of young people with intelligence, integrity, and initiative. In these people, I look not so much for technical competence—we will teach them that—but for the ability to think for themselves, to understand the basic principles of the courses they have taken, and to speak clearly. From what I have seen, our schools are not providing a good education.

The heart of any civilization is its education. Of the glories of ancient Greece, none was greater than Plato's Academy. Of all that the Middle Ages created, nothing was greater than the universities. Of the spirit of the Renaissance, it is humanism that is its greatest legacy. We will be tomorrow what our schools are today.

Our future citizens are now students in elementary and secondary schools. We have a right as well as a duty to ask how well the schools, teachers, administrators, and parents are meeting their responsibility. Several signs warn us that our educational system is falling behind the needs of our society.

In the mid-1960's scores of college entrance examinations began a decline. The drop is revealed in the scores for the Scholastic Aptitude Tests (SAT)—the entrance examinations required by most colleges. The American College Tests, the Minnesota Scholastic Achievement Test, and the Iowa Tests of Educational Development show a similar trend. The reasons are complex and are still being studied. Possibly the drop does not reflect a real diminution in student-learning skills. Perhaps it is because the numbers of students taking the tests have greatly increased. Perhaps poorer students have been urged to take the tests so as to gain admission to college. However, there is other evidence of the need for improvement of our educational process.

Last year the Private Higher Education Annual Report found ". . . an appalling decline in the preparation of newly admitted students in reading, writing, and mathematics." The National Assessment of Educational Progress, a federally financed organization, recently studied writing samples of 7,500 youths. Only a tenth of the 9-year olds, a third of the 13-year olds, and half the 17-year olds could organize ideas on paper.

Most wrote random sentences. In 1975 the University of California reported that 75 percent of the state's best high school graduates failed a nationally-used English composition test. They could not express themselves, choose the right word to complete a thought, or organize their writing.

My own experience, based on the results of interviews I have conducted of over 12,000 graduates from some 150 different colleges and universities over the past thirty years, confirms that there is a serious problem. Certain impressions emerge from these interviews. For example, although a student's record may show that he has taken a variety of courses with impressive titles, his basic knowledge of fundamentals has declined markedly in relation to his counterpart of 15 years ago. It is not uncommon for me to interview a recent graduate from a "good" college who has received a Masters Degree in Mathematics but who is incapable of solving a tenth grade algebra problem. I have interviewed students receiving a Bachelors Degree in Electrical Engineering who do not know the difference between alternating current and direct current. I could recite case after case, not only in engineering, mathematics, and science but in history, foreign language, economics, and other fields, where the students could not discuss even the fundamentals of their disciplines. Yet each of these students honestly believed that he had done well in school and had learned what was expected of him.

This is the tragedy. To further emphasize the severity of the problem, you should recognize that I only interview students with relatively high standings in their schools.

The problem is not confined to the colleges. In the nuclear program, I am also responsible for training enlisted personnel. Within the past five years, I have been compelled to incorporate a remedial "pre-nuclear power school" because of the increasing attrition due to academic failures. I now teach courses in the basics of mathematics, physics, and chemistry to enlisted students before they enter the nuclear power school. Here again, remember that we only accept into the nuclear program those enlisted men of the highest mental caliber. All must have high school diplomas. You can appreciate the problem faced by the rest of the Navy in attempting to train personnel of lesser ability to handle the complex equipment now in use.

Outside of the nuclear program, the Navy, in my opinion, has fallen prey to the siren of easy education. Today, for a number of reasons, the Navy uses the so-called "self-pace" method of teaching. The student can proceed at his own pace using programmed lesson plans with no meaningful checks along the way to determine how much he has learned. When he thinks he has learned a given lesson, he takes a single test and then proceeds to the next lesson. Often the answers are supplied on the same page as the questions. After going through the required number of lessons, he then "graduates" himself and proceeds to a ship. To illustrate the absurdity of the situation, there are examples where a foreign student, who could not read or write English, successfully passed the course.

Before we put too much blame on the Navy or think this is just a Navy problem, let me remind you that this method of teaching was not devised by the Navy itself. The Navy sought "expert" advice from recognized educators throughout the United States—educators who have been and are shaping the educational methods of our elementary schools, high schools, and colleges. These are the so-called experts. Unfortunately, they never have to use the products of their efforts. If their system is a failure, they blame ethnic background, unhappy homelife, or poor motivation.

Only some of the elementary and secondary students will go on to college, but nearly all will become voters. How well prepared are they to exercise the rights, responsibilities, and obligations of citizenship?

The erosion of elementary and secondary education is undermining our institutions of higher education. Faced with an ever increasing number of freshmen who cannot write coherent sentences or handle simple arithmetic, more and more colleges and universities are forced to offer remedial courses. Many college professors state that students are not as well prepared as they were a few years ago. What a waste it is for universities to have to teach fundamentals that should have been mastered earlier. They have, however, brought the problem on themselves. Instead of refusing admittance to unqualified students, they continue to offer remedial courses in record numbers in order to maintain enrollment.

The effectiveness of such remedial courses remains a big question. In the words of one English department head at a major university: "It is a breathtakingly difficult assignment to undo the failure of a lifetime in one or two academic terms." This statement contains a profound truth. The years of youth are a precious—a unique—time when the mind is at its freshest and most inquisitive. If it is dulled, it may never recover the sharp edge of eagerness and enthusiasm.

Some parts of the educational establishment seem to discount the decline in test scores. Some educators have questioned whether the national test score averages should be made available to the public. Others assert that standardized tests are a violation of human and civil rights and that they discriminate against minorities and poor readers.

Tests of this sort are not intended to measure a student's value as a person but to measure the extent of his knowledge and the quality of his work. Parents have a right and need to know where their children stand academically. Similarly, the public has a right and need to know how their schools and school districts stand in relation to national and regional averages and in relation to previous test results. The abolition of tests or the failure to disclose test scores would be a violation of these rights.

Unfortunately, the preponderance of data collected on education is used to measure what resources we invest in our education system, rather than what it has accomplished. Those statistics which purport to measure our return on investment do so primarily in quantitative terms, such as the number of desks filled or diplomas awarded. Standardized tests, while not perfect, are one of the few measures that can give us some qualitative indication of what our children are learning and how well our schools are doing their job. Yet many educators emphasize other statistics which have nothing to do with the quality of education.

Grade inflation is a particularly pernicious result of declining standards in education. The decline in academic skills shown by achievement test scores is masked to a large extent by the fact that students nationwide are receiving higher grades. At many colleges, three-quarters of the grades given are A's or B's. Grade inflation at high school appears to be just as prevalent. The high school diploma and the college degree have been cheapened to the point where ofttimes they no longer stand for recognition of academic achievement.

A tragic example of grade inflation occurred here in Washington last year. Despite a nearly straight A average, the valedictorian of a high school failed to meet the entrance requirements of a local university. His college board examination scores were but half of what the university expected. One official speculated that, since discipline is such a major problem in the District schools, ". . . a nice kid might have his grades inflated." In any event, the result could only have been a crushing disappointment to the boy and his parents. They were deluded into thinking he was getting a good education; they were defrauded.

In another case, a Long Island, New York, high school graduate brought suit against the school system for "educational malpractice." He alleged that he was not taught enough reading and writing to get and hold a decent job. In evidence was his high school transcript, showing that he was promoted from grade to grade despite a consistent record of failing marks. For example, he was admitted to senior English without having passed either sophomore or junior English.

Much has been written about grade inflation, but it is an effect rather than a cause. It is the inevitable result of restructuring courses and methods of teaching to demand less work on the part of the students. Where demands are low, students get higher grades than they earn.

When I interview a candidate who does not seem to know much about the subjects he has studied, I frequently find he is the product of an educational process which contains few comprehensive lesson plans detailing on a day-to-day basis what the student must read or learn; where he is given a general outline of the entire course and told to proceed at will; where the few tests given cover but broad aspects of the material; or where grades are primarily based on student participation in class.

There will always be those few students who, for whatever reason, will excel and will, on their own, master the subject. They do this in spite of the system, rather than because of it. In many cases, the teacher is more of an umpire than a teacher; he is not required nor expected to know much. As long as he can "relate" with the students he is doing his job. From all of this evolves grade inflation. But the problem is more fundamental. The student has not learned, but has been led to believe that he has mastered the course because he has done what the system calls for. He is happy; the teacher is happy; the school is happy; the parents are happy. Only society is unhappy.

Parents and students must accept the unpleasant fact that today's awards and diplomas do not necessarily imply academic achievement. Grade inflation, far from helping students, robs them of a proper . education; too late they discover how little they really learned. Accepting a diploma without an education makes no more sense than getting vaccinated and not finding out if the vaccination took. A person who believes he is safely vaccinated, but is not, is a danger to himself and to others. In an address to the Washington-area graduating classes of 1977, the Reverend Jesse Jackson made a similar point. He cautioned that accepting a diploma without an education makes no more sense than paying for a shopping cart full of groceries and leaving the store with just the receipt. If our educational system is to be improved, parents and students must view education as the pursuit of knowledge and the development of essential skills such as reading, writing, and the ability to reason—not simply the pursuit of grades and diplomas.

The problem of functional illiteracy is growing at a time when technology demands special care. Recent Navy experience illustrates this problem. The Chief of Naval Personnel recently disclosed that we are having trouble finding recruits who read well enough to do their job. He cited the example of a sailor who, because he could not read instructions, caused 250,000 dollars in damage to a diesel engine by attempting to make repairs based solely on illustrations in the manual. As a result of the increasing number of high school graduates who cannot read adequately, the Navy now requires many of its recruits to enroll in a six-week remedial course aimed at raising their reading ability to the sixth grade level.

There are other indications of the severity of the reading problem. This year saw the publication of a new magazine directed specifically at junior high school students who are able to read only at the second grade level. The publisher established a subscription goal of 350,000 for the new magazine. He already has in circulation a magazine geared to high school students who read at the fourth to sixth grade level.

Parents share in the responsibility for inadequacies in our children's academic skill. They do not spend enough time with the child nor show sufficient interest in his school work. Further, many parents have come to distrust their own ability to gauge whether their children are receiving a proper education. Confronted by a strange educational program and unfamiliar jargon, many have come to believe that only professional educators can judge how well a child is doing in school. Other parents subscribe to the belief, common in our wealthy society, that any problem can be solved if only enough money is spent, yet the amount spent throughout the nation for primary and secondary schools between 1960 and 1973 went up by 199 percent. Consequently, our educational system is replete with monuments to this philosophy of "money cures all": elaborate school buildings, instructional media for which we pay three times as much as for textbooks, and calculators for children who do not even know arithmetic. But the education of our youth is something that requires personal dedication and a substantial investment of time, not just money.

Television has contributed greatly to the decline in the reading and writing skills of the child. Studies have shown that high school seniors have spent more of their lives in front of television than inside the classroom. Parents are derelict in allowing their children to become slaves of television. They watch television along with their children and thereby give parental approbation to the values that television transmits. Worse, some parents use television as an electronic babysitter.

The television set is definitely inferior to the book as a means of education. Watching is passive; reading is active. Television is non-stop, giving the viewer no time to think; he is rushed from one scene to the next. A book allows a person to stop, reflect, to turn back to a remembered passage—months or even years after the first reading. A book can encourage imagination and independent thought. Television, however, frequently leaves children with a false image of the real world. Television is conditioning them to think that any problem can be resolved in a half hour; or if difficult, perhaps an hour. It tends.to shorten the attention spans of children, making the hard work of learning appear even more tedious when compared with the entertainment-oriented television. It fails to develop critical and analytical thought—qualities which we have prized throughout our history. Its primary purpose appears to be to make consumers of grownups and children.

Changes in society have no doubt played their part in the deterioration of the quality of education. But I believe the primary blame for the decline rests squarely on the educational establishment. Many educators would have us believe that the schools themselves have played no part in the decline of student ability. Self-deception is particularly rife in educational research.

In 1966 the Coleman report, typical of many similar studies by the U. S. Office of Education, came to the startling conclusion that the socioeconomic status of a child's classmates was a more important influence on his achievement than his teacher. This conclusion was astonishing because the offspring of countless uneducated immigrants today occupy leading positions in business, the professions, public life, and the arts. Yet, influential educators, intellectuals, journalists, legislators, administrators, and judges quickly and uncritically accepted this hypothesis.

Coleman's finding became the rationale for many efforts to require more racially balanced schools, and resulted in vast expenditures of public funds; political and racial arguments; and dislocations in school systems. Later investigation showed the data to have been misinterpreted and incorrectly evaluated. After years of support for and identification with the policy of mandatory racial balance as an educational goal, Coleman, in 1975, subsequent to criticism of his thesis, changed his position. He not only dissociated himself from the legal and political decisions engendered by his report, but admitted that schools did, perhaps, make a difference in the achievement of children.

Left to their own designs, educators, in the name of innovation, have made it possible for many students to avoid courses that would provide a solid grounding in the basic academic subjects of reading, writing, and mathematics. Studies have documented declines in enrollment in basic academic courses. In some cases, courses in basic skills have been supplanted by electives or extracurricular activity. In others, the total number of instructional hours per school year has declined.

In an effort to instill more relevance in education, many schools have invested substantial resources in programs which seem directed more toward providing amusement than toward developing children's ability to sort facts and make intelligent decisions. Couched in the unintelligible jargon of systems analysis and other pseudo-sciences, these programs place a high priority on freedom of choice in course selection without first ensuring that the choices are structured to meet academic needs.

Much experimentation has focused on ways to give the student greater opportunity for "creativity." The ends to which this policy is taken are absurd. One school superintendent forbade the use of coloring books on the grounds that they force pupils to confine their artistic efforts within fixed lines. Another superintendent of a big city school system felt that since children were allowed to be creative at home, they should be allowed to be creative at school. The resultant milling around of children in the schools led to chaos. This was a predictable result, since most children are not competent to decide what is in their own best interest or how much creative freedom they should enjoy.

This drift in educational thinking strikes at the very basis and fabric of society. Schools are fostering attitudes in students that ill-prepare them for the harsh realities of the world. Take the idea that learning must be easy and preferably entertaining. This idea is cruel to the child and dangerous to society, for children grow up believing that they need not struggle to excel.

In the attempt to make learning fun, and I believe to make themselves popular, many teachers and administrators have de-emphasized disciplined thought and work habits, and stressed creativity, individuality, and "feeling", to the detriment of academic achievement. What this means in teaching English, for example, is a turning away from serious reading and closely reasoned writing. Students, especially at the high school level, are led to believe that oral and written expression need no real effort. Feelings are often placed ahead of language as the primary tool of expression. In consequence, students are cheated; they do not face the difficulties inherent in good writing, and do not develop the ability to write well. This approach may free instructors from tedious grading of papers and themes; however, it does not develop the necessary skills.

One of the truths of life is that if you want to influence others, it is not enough to know a subject; you must also be able to express what you know. That is what makes the ability to write clearly a most valuable skill. But many students simply do not value writing skill in a world they see as predominantly technical. Teachers who hold grammatical achievements in small esteem reinforce this notion.

The "learning is easy" movement has also affected mathematics. In the late 1950's, "new math" was hailed as a revolutionary new method of teaching a subject that generations of children had found "distasteful," or "not fun." By abolishing the systematic progression from arithmetic through algebra and geometry, new math was supposed to make it easy for children to understand and enjoy mathematics. The results were predictable. The money spent on training teachers in the new math and rewriting textbooks was largely wasted. Millions of young Americans have learned something of sets, variables, and binary operations. But many have failed to learn the arithmetic needed to balance checkbooks or figure income taxes, and most have a poor foundation from which to move to higher mathematics, physics, and engineering.

There is a passage in the Talmud that reads: "The world is upheld by children who study." Learning can be interesting, rewarding, and exciting, but it requires effort. It is work! No learning takes place, just as no ditch gets dug, without work. Mental sweat is required of the student who would acquire the skills, concepts, and information necessary to master a course. Preaching the doctrine that learning should be easy implies that society has an obligation to make life easy, and promotes an already far too prevalent attitude against work. If our goal is to entertain our children, we can do so far more cheaply than by sending them to schools.

Despite growing disenchantment by many parents, teachers, and students with undisciplined learning and experimentation, these programs continue to receive strong support from educational leaders. The new head of the U. S. Office of Education recently spoke of alternative educational approaches for high school students, contending that children today "are more sophisticated." He attributes their earlier maturation to "television and other factors." From my experience, many of today's students are academically immature and unsophisticated.

"Alternative educational approaches" should not detract from a school's primary mission of educating students in the basic skills. The following teacher's note on a report card, as it appeared in the Georgia Education Digest, best expresses this point: "Alvin excels in initiative, group integration, responsiveness, and activity participation. Now if he'd only learn to read and write."

Teachers share in the blame for the condition of our schools today. If students had no teaching machines or visual aids, no buildings, counselors or administrators, they would still learn if they had competent teachers. As a group, today's graduates destined for teaching positions do not possess a solid academic background. Some educationists hold the fallacious belief that expertise in classroom management can supplant knowledge. While classroom management, discipline, and presentation are important, they are no substitute for competence in the subject being taught. In Europe, teachers are required to know the subject matter. Those teaching above the elementary level have advanced degrees in their field. But in this country, teachers often are not required to have a mastery of a subject they teach. What many states consider as important qualifications are the number of education courses in teaching techniques—not competence or skill in subject matter. Restrictive state laws promote this view. In today's climate, a smart prospective teacher will avoid an advanced degree because the higher salary it commands makes it more difficult to get a job.

One publisher of science materials for junior and senior high schools touted his product.as follows:

> "And it does not require specific subject background on the part of the earth science teacher."

In other words, the teacher does not need to know much earth science in order to use these teaching materials. But this problem is more widespread: foreign languages are taught in many high schools by those not fluent in them; geometry and algebra by those who know little mathematics. Most English teachers are literature majors who resent teaching writing skills or who are unqualified to teach them.

Studies have shown that, on the average, prospective teachers exhibit the lowest academic ability of any major group in higher education. One study revealed the startling fact that, in terms of high school academic performance, teachers ranked above only one other group—that composed of students who had dropped out of college with failing marks. This conclusion is supported by the Educational Testing Service which found that those taking the Graduate Record Examination in the field of education consistently made lower scores than those in any other field.

Low ability, combined with second-rate training, means that many students finishing teacher education programs are not competent to teach. For instance, one Florida county, in 1976, found that one third of the applicants for teaching jobs failed an eighth grade level general knowledge test. Confronted with such evidence, the state's Board of Regents decided to require professional competency tests before a prospective teacher can graduate from a state university.

When unqualified people are admitted to the teaching ranks, their incompetency either goes unnoticed because of inadequate teacher performance measures, or, once discovered, the incompetent teacher is protected from removal by tenure. Today the laws are so restrictive in most states that superintendents and school boards seldom even try to dismiss incompetents. In a 23-year period, Cleveland, Ohio's largest school system managed to dismiss only one tenured teacher. Over a two-year period ending in March, 1975, there were only fourteen tenured teachers dismissed in the entire state of California. A rare exception occurred in April of this year when the school board in Goochland County, Virginia fired an elementary school teacher on grounds of incompetence because of her atrocious grammar. The teacher, a veteran of twelve years in the Goochland school system, was dismissed after a parent complained about the grammar in a third- and fourth-grade social studies guide the teacher had prepared for her students.

Among the questions the teacher had prepared were these, reproduced verbatim:

> "What did the sculpture told the archeologists ?"
>
> "Why did the Maya sailed to other ports ?"
>
> "How many names did each Maya had ?"

"The grammar was atrocious, " the school superintendent said: "I would just assume a college graduate wouldn't have this sort of weakness. "

With that comment, the superintendent hit upon the fundamental weakness in our approach to education in this country. We have all assumed that the 120 billion dollars we spent in 1975 and all sums before it is resulting in well-educated children.

To attract intelligent teachers, schools need to make teaching professional. Although many teachers are incompetent and probably paid more than they deserve, their pay in general is not sufficiently high to attract top-flight people to the profession. Labor agreements between school districts and teachers effectively rule out remuneration based on merit. Extra stipends are payable for coaching or extracurricular activities but not for classroom performance. Ideally there should be a merit pay system or other means of recognizing excellence in teaching. The reward of watching young minds develop is not always enough to sustain lifetime dedication to teaching.

Pay, however, does not guarantee performance. In the Federal Government and in private industry, there are many examples of people who, although well paid, do not perform to their capacity. However, parents can encourage schools to provide conditions more conducive to professional teaching. For example, at the high school level, because the teacher himself must handle large amounts of the clerical and administrative workload, there are great pressures on teachers to simplify tests and grading, minimize assignments, and avoid written work. It is not surprising in these circumstances that true and false examinations or multiple choice tests tend to replace the written assignments so essential to the development of writing and reasoning skills. How many teachers are willing to devise comprehensive tests and assignments when they must draft, type, and reproduce them essentially on their own time? The availability of administrative and clerical support for teachers would probably enhance the quality of education and teacher morale more than the investment of equivalent funds in teacher salaries.

On-the-job evaluation and training of teachers by experienced and competent supervisors is needed to rid our system of bad teaching. School teachers are among the most unsupervised workers in society. Many administrators never truly evaluate the teacher's performance on the job. The notion of academic freedom—of doubtful applicability to a high school—combined with the protection of tenure agreements, often results in each teacher determining on his own what subject matter should be taught and how it should be presented. My experience has been that in any successful endeavor, those in charge must involve themselves in the details of day-to-day operations. The training of subordinates is one of the most important functions a person in charge must perform. In many schools, training of teachers consists only of granting them time off to attend conventions and symposia and requiring that they periodically take college courses in subjects of interest to them. Even in schools where adequate training and supervision exist, an incompetent or uninterested teacher is so difficult to fire that administrators frequently do not make the effort.

Academic programs must be better insulated from the unhealthy side effects of athletic programs and extracurricular activities. Even with the present surplus of teachers, the qualification to coach an athletic team frequently outweighs academic qualification in filling teacher vacancies. Coaches or potential coaches, who may not be as well qualified academically as other applicants, are often selected to fill vacancies in such areas as social studies, mathematics, science, and English. In one Virginia county, for example, staff reductions are based on strict seniority with the most junior persons transferred first. Principals may exempt athletic coaches and sponsors of certain extracurricular activities from this practice, but excellence in the classroom is not a basis for exemption. If communities desire better education for their youth, academic consideration must be given precedence over athletics and extracurricular activities.

Good teachers are essential to good education. Over 2,300 years ago, Plato said:

> "I maintain that every one of us should seek out the best teacher he can find, first for ourselves, and then for the youth, regardless of expense or anything."

This is good advice today.

In this country, neither the names of educational institutions, nor their curricula, their diplomas or degrees represent a definitive and known standard of intellectual accomplishment. There are a number of standardized achievement tests that show the relative standing of students and schools against national norms, but not how much a child knows in an absolute sense. It is small consolation to learn that you know more than your contemporaries about swimming if none of you can swim.

The National Assessment of Educational Progress, a government-funded organization, is now testing how much students actually know of various subjects and at various grade levels. But these tests are conducted on a statistical sampling basis and not given to all students. Moreover, no one has attempted to define how much a child should know at certain stages of his academic career.

Historically, powerful lobbying organizations and unions—such as the National Education Association, the American Association of School Administrators, and the American Federation of Teachers—have fought against efforts to measure the performance of teachers and school systems. They prefer the present system in which it is impossible to pinpoint responsibility.

By far the most important deficiency of our educational system is the absence of a professional tradition of self-correction. The scientist has to provide the results of his work to colleagues. The mark of any developed profession is the practice of correcting mistakes. But the educational establishment has no means to perform this function. The Office of Education will not do the job. One hundred and ten years ago, Congress created the Department of Education and charged it with broad responsibilities including:

> ". . . collecting such statistics and facts as shall show the condition and progress of education in the several States and Territories, diffusing such information respecting the organization and management of schools and school systems, and methods of teaching, as shall aid the people of the United States in the establishment and maintenance of efficient school systems, and otherwise promote the cause of education throughout the country."

Yet, in more than 100 years of existence, the Department of Education—now the Office of Education—has failed to come to grips with the need for proper accountability within the educational establishment. In my opinion, the National Education Association and other professional educators wield so much influence in the Office of Education that it is unable to act objectively and in the public interest. The burden thus falls on Congress and on this Committee to act.

I recommend, Mr. Chairman, that you and perhaps your counterpart in the House of Representatives appoint a panel of nationally prominent persons in representative walks of life to develop National Scholastic Standards.

The standards should consist of specific, minimum competency requirements for various levels—second grade, fourth grade, sixth grade, and so on. In addition, there should be a formal system of tests to show not only the relative standing of students and schools against national norms but also whether students meet the minimum competency requirements. This would provide a yardstick to measure academic performance—a means of assessing achievement of individual students, effectiveness of teachers, and overall academic attainment of schools. Summaries of test results by school, district, and state would enable parents and educators to measure where their schools stand relative to the national standards and to other schools in the country. For the first time, parents would have a means to hold teachers and schools accountable for the quality of their work.

The states should be urged to adopt these standards and administer examinations. However, if local authorities do not provide the service, parents should be able to have their children tested against the national standards at government expense.

Nothing in this proposal would violate the constitutional separation of powers between federal and state governments, nor counter our tradition of local and state control of schools. I envisage the rendering of a service, not regulation in any way, shape, or manner.

The creation of National Scholastic Standards is the minimum step we must take. Lord Kelvin said: "When you can measure what you are speaking about. . . you know something about it; but when you cannot measure it, . . . your knowledge is of a meager and unsatisfactory kind."

The need for National Scholastic Standards has been recognized by some national leaders. For example, in 1963 President Kennedy became interested in this proposal and asked for my recommendations. He sent my proposal to the Commissioner on Education for study by the University of Chicago and the Carnegie Foundation. The President kept me informed of their progress. This effort ended with his untimely death. President Nixon in his education message of March 3, 1970, also urged national standards as a means of measuring the effectiveness of schools. Yet today we are no closer to having these standards.

The American public is becoming aware that our educational system needs correction. A poll taken in 1976 shows that, by a margin of 2 to 1, Americans are of the opinion that all students should be required to pass a standard nationwide examination to qualify for a high-school diploma. A few states have made preliminary attempts to set standards. However these efforts cannot substitute for national standards.

Our states and Congress have been most generous in providing funds for the education of our children. Our per capita expenditure for education is greater than that of any other country in the world. But neither the states nor Congress has exercised adequate oversight of how the money has been spent.

The impetus must come from Congress to see that national standards are set. Congress cannot rely on the Office of Education. If Congress lives up to its responsibility and sees that standards are set, I believe the public will demand their adoption by the education community.

We would be wise to heed the words of Aristotle who said that the chief concern of the lawgiver must be the education of the young.

EDITORIAL

From

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Important decisions relative to the future development of atomic power must frequently be made by people who do not necessarily have an intimate knowledge of the technical aspects of reactors. These people are, nonetheless, interested in what a reactor plant will do, how much it will cost, how long it will take to build, and how long and how well it will operate. When they attempt to learn these things, they become aware of confusion existing in the reactor business. There appears to be unresolved conflict on almost every issue that arises.

I believe that this confusion stems from a failure to distinguish between the academic and the practical. These apparent conflicts can usually be explained only when the various aspects of the issue are resolved into their academic and practical components. To aid in this resolution, it is possible to define in a general way those characteristics which distinguish the one from the other.

An academic reactor or reactor plant almost always has the following basic characteristics:

1. It is simple.
2. It is small.
3. It is cheap.
4. It is light.
5. It can be built very quickly.
6. It is very flexible in purpose ("omnibus reactor").
7. Very little development is required. It will use mostly "off-the-shelf" components.
8. The reactor is in the study phase. It is not being built now.

On the other hand, a practical reactor plant can be distinguished by the following characteristics:

1. It is being built now.
2. It is behind schedule.
3. It is requiring an immense amount of development on apparently trivial items. Corrosion, in particular, is a problem.

4. It is very expensive.

5. It takes a long time to build because of the engineering development problems.

6. It is large.

7. It is heavy.

8. It is complicated.

A common example can be given to indicate the application of the above generalities:

A fairly conventional academic power reactor might use natural or slightly enriched uranium rods in which the burn-up is a minimum of 10,000 megawatt-days per ton. The fission products are confined to the fuel element by a simple cladding technique. The elements operate in high-pressure water at 600° F.

In the practical reactor, difficulties are encountered. No element of the above type has been tested beyond a few thousand megawatt-days per ton. Eight years of work on high uranium fuels have failed to produce cladding techniques which give really satisfactory performance in water at even 200° F. At 600° F uranium reacts violently when exposed to water. The Chalk River experience shows the difficulty of maintaining a plant in which some fission products have escaped.

The tools of the academic-reactor designer are a piece of paper and a pencil with an eraser. If a mistake is made, it can always be erased and changed. If the practical-reactor designer errs, he wears the mistake around his neck; it cannot be erased. Everyone can see it.

The academic-reactor designer is a dilettante. He has not had to assume any real responsibility in connection with his projects. He is free to luxuriate in elegant ideas, the practical shortcomings of which can be relegated to the category of "mere technical details." The practical-reactor designer must live with these same technical details. Although recalcitrant and awkward, they must be solved and cannot be put off until tomorrow. Their solutions require manpower, time, and money.

Unfortunately for those who must make far-reaching decisions without the benefit of an intimate knowledge of reactor technology and unfortunately for the interested public, it is much easier to get the academic side of an issue than the practical side. For a large part those involved with the academic reactors have more inclination and time to present their ideas in reports and orally to those who will listen. Since they are innocently unaware of the real but hidden difficulties of their plans, they speak with great facility and confidence. Those involved with practical reactors, humbled by their experiences, speak less and worry more.

Yet it is incumbent on those in high places to make wise decisions and it is reasonable and important that the public be correctly informed. It is consequently incumbent on all of us to state the facts as forthrightly as possible. Although it is probably impossible to have reactor ideas labeled as "practical" or "academic" by the authors, it is worth while for both the authors and the audience to bear in mind this distinction and to be guided thereby.

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Captain, USN

June 5, 1953

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ADMINISTERING A LARGE MILITARY DEVELOPMENT PROJECT

During the past fifteen years I have addressed the students of the Postgraduate School at Annapolis on a number of occasions. My talks have all been confined to technical matters, and they have not required extensive preparation, because I was talking about matters familiar to me, and which dealt with things, with engineering facts, which I could discuss with some facility and with objectivity.

But when one talks about how a job is done, he necessarily talks about people, and not about things. He enters the realm of the subjective. His thoughts and his actions stem from his personality, from his own experience, from his own view of things. The temptation is strong to talk in generalities, to define accomplishment in terms of standards of organization; or to stress the oft-repeated qualities of leadership, such as intelligence, wisdom, honesty, virtue, tact, grace, agressiveness, humility, courage, tenacity, and so on - in other words to describe not a man but who possesses the attributes of a God.

In my younger days I was bothered by these criteria. Somehow, things just didn't work out the way the books on administration and on leadership said they should, and I early became aware that I could never qualify as a leader, if it were really necessary that I possess the twenty or so qualities most books or articles on leadership claimed to be necessary. So far, I have found no one in the Navy or in industry who possesses more than a few of these qualities, and so I have regretfully come to the conclusion that the only person who ever possessed all of them died some 1900 years ago.

I mention this because the quest for the impossible may so condition us as to prevent us from accomplishing the possible.

Politics has been defined as the art of the possible. In my opinion, politicians are those men who more face up to the realities of the world and of mankind, than any other group of citizens. A politician must get things done, or he loses office.

I commend to you the political approach towards accomplishing objectives. One thing that can be said for it is that it works. A very eminent Secretary of the Navy, Mr. Forrestal, once said: "Government without politics is like conception without sex." And it will probably surprise you to know that even George Washington practiced politics in the appointment and promotion of officers when he considered it necessary to do so for the public good. He once wrote:

> "But if officers will not see into the political motives by which I am sometimes governed in my appointments, and which the good of the common cause renders indispensably necessary, it is unfortunate; but it cannot, because it ought not, divert me from the practice of a duty, which I think promotes the interests of the United States, and is consistent with the view of that power under which I act".

The development of naval nuclear propulsion plants is a good example of how one goes about getting a job done. It is a good subject to study for methods, because it involves not only the accomplishment of a recognized difficult technical operation, in which expenditure of hundreds of millions of dollars is necessary, but also because it involves the intimate working together of two large governmental organizations, the Navy on on the one hand, and a civilian organization, The Atomic Energy

Commission, on the other. It has involved the establishment of procedures and ways of doing government business for which there was no precedent, and which I believe will be necessary in future for similar large projects.

The first step toward accomplishing anything is to have a goal. Goals are set by people and not by organizations. At some point, sooner or later, organizations lend their names to a project, but the concept and the initial work is always started by an individual. This is difficult for military people to comprehend, because they are used to operating under a relatively rigid impersonal system. Official letters, for example, are written in the third person; the appearance is that a Bureau or an Office does something. It should be obvious that Bureaus and Offices are inanimate, and therefore cannot generate ideas or do things.

Early in 1946 the Manhattan District decided to build an atomic power pile to demonstrate peaceful application of atomic energy. Industry, as well as the Army, Navy and Air Corps, were invited to participate in the technical work at Oak Ridge. Several officers and civilians were sent by the Navy. I was the senior one of the group. All of the naval officers and the civilian engineers were sent as individuals to be assigned by the Manhattan District as they considered necessary. At Oak Ridge the Navy people were assigned to various disconnected activities and no serious thought was given to their education. I soon realized that unless the Navy people were organized into a unit and their training and education systematized we would complete our year's stay at Oak Ridge and still not be prepared to commence work on an atomic propulsion plant. Since the Bureau of Ships was in no position formally to request such organization, I established personal relations with the military and scientific people at Oak Ridge, and soon all of the Navy people were assigned to me. I arranged for their general education in nuclear matters, and, in addition, assigned each one a specialty in which he was to become proficient. The result was that by the time we left Oak Ridge we had the nucleus of a technical organization.

The preparation and the writing of reports is a tedious and unwelcome job, when one is already devoting most of his time to study. But I knew that it was important that the Chief of the Bureau understand what we were doing. So I compiled a list of reports which were to be prepared during the year and assigned them to individuals to prepare. The result was, that once every two weeks a report covering a specific technical subject was sent out. These reports served two valuable purposes; they forced the students to learn the specialized subject, and at the same time they served to educate the leading people in the Bureau of the actual status of nuclear power.

The next step was to select a suitable naval vessel, and a suitable reactor to be developed. After considerable discussion we agreed that the submarine offered the greatest promise, and that a thermal neutron, water cooled reactor, the best propulsion plant.

Because we were closely organized and fairly well trained in nuclear technology in accordance with what was known at the time, we were in a position to take advantage of any opportunity which might arise. Such an opportunity soon came.

Because work on the power pile at Oak Ridge did not pan out well, the Atomic Energy Commission, which had replaced the Manhattan District, decided to cancel the project. Because we were on the spot, because we were organized as a group and knew what we wanted, we were able, without the Washington authorities realizing it, to divert the people and the effort at Oak Ridge to the study of a submarine pile.

Shortly after this, we all returned to Washington. The naval group was broken up and assigned to different duties. Nevertheless I continued in my effort to achieve nuclear propulsion for a submarine. There was now a group of scientists and engineers studying the problem at Oak Ridge, but no authorization for the work, and no requirement for a nuclear submarine by the Navy. Obviously it was only a matter of a short time before the work would be terminated, unless the Navy itself decided it wanted an atomic submarine and succeeded in convincing the Atomic Energy Commission that it was important.

So the next step was to obtain a "Hunting License". This is a piece of paper which authorizes one to do a certain thing. It is frequently called a directive, or some such descriptive term. One must have such a piece of paper as a "Huhting License"in Government, if he is to get anything done.

Contrary to what most naval officers believe, particularly those who have not had duty in Washington, policy letters and other important documents signed by the Secretary of the Navy or by the Chief of Naval Operations are not prepared by them, but by the particular individual who wants the job done. It is he who must fight the policy letter through the various layers and levels before it reaches the Chief of Naval

Operations or the Secretary of the Navy.

This requires tenacity and considerable patience, because the Navy Department is like an automobile with six individual brakes; the car cannot start until all six passengers agree to release their brake. Many individuals in a large organization have the power to say "No" - and many projects are stopped because the originator meets discouragement after discouragement and finally says "what the hell", or else is transferred to other duty.

Therefore, one must have a saleable item which appeals to a large group of people - preferably to those in responsible positions. As a rule, the higher people are in an organization, the more receptive they are to new ideas, and the problem is how to get to these high people. This requires a thorough knowledge of the organization, of the mental attitude of those who might approve and of those who might disapprove. There are many who will disapprove. They are like onlookers in a struggle in which they have not personal stake. They are adept at the etiquettes of organizations, but without experience in doing things. They must be by-passed.

In this process of obtaining the "Hunting License", as well as obtaining approval of any other important idea, the method of presentation is important. If you have a proposal with five points, for example, don't try to sell all five at one time. Likewise don't try to sell 5 points simultaneously to a group of 5 people. If one of the 5 objects to one of the proposals, he will vote against your entire package. If three of the 5 each object to one of the proposals, then your whole package is lost. But if you only present one proposal at a time, you can stand to have two people vote against you, and still win out.

It is also well to remember that many important people fail to become interested in various projects, not because they lack interest, but because they lack time. Therefore, you must so plan that your own project receives the attention of these people.

Having obtained the "Hunting License" you must set about implementing it. "Hunting Licenses" are not too difficult to obtain. The possession of a license is no guarantee of success. There are generally more hunting licenses issued than there are deer to be hunted. Only the persistent hunter ever gets a deer. First the hunter must get a gun; this is vulgarly known in government as "money" - and without money nothing but good will can be obtained.

It takes considerable thought, work, and time to obtain the funds necessary to carry on a large project. But since nothing can be done without money, this necessarily takes priority over all other matters. In the Defense Establishment there are about 8 offices we must go through before the case is presented to the Bureau of the Budget. And any one of these can deny the funds or decrease the amount.

In the AEC it is much less difficult. The case is presented to the five Commissioners, and, if they approve, it goes directly to the Bureau of the Budget.

It is extremely fortunate that in the early years of our project we were financed almost entirely by the AEC. To have had to go through the Navy procedure in those days, and to convince the many people who possessed veto power - might have resulted in considerable delay in getting started. In the beginning we obtained nearly all of our funds from the AEC.

Gradually the Navy portion has been increasing, until now the AEC supplies about 75% of the research and development funds, and the Navy about 25%. The ability to draw on funds from two distinct agencies is a very valuable one. When the rules of one do not permit certain work to be done, the rules of the other generally do.

The AEC, by law, controls all atomic energy work; no one, including the Navy, can engage in this work unless authorized by the AEC. It became obvious to me from the first, that if we were to play an active and significant role in developing naval atomic propulsion plants, we had to become established as an integral part of the AEC. After about one year of politiking I was finally ordered to duty in the AEC as Chief of the Naval Reactors Branch. At the same time I was assigned additional duty as Head of the Nuclear Power Division of the Bureau of Ships. Thus, one person, one group of people, acted for both the AEC and the Navy. By being part of the AEC we achieved a powerful position to assist in formulating policy and in obtaining money. We have offices in the AEC and in the Navy. Some of our officers are assigned to the AEC, some to the Navy. The same applies to civilian personnel. We use our officers, our engineers, our clerical help, interchangeably - just as we mix our money.

As far as I know this was the first instance in government where a single group of people acted in a line capacity for both a military agency and a civilian agency. In modern war the military cannot stand alone. The armed forces are but the cutting edge of a sword; the civilian effort, including industry, government and the national institutions and culture are the heft of the sword which backs up the military.

Therefore it is likely that this type of organization will be followed in the future. Our way of doing business is known and approved by the Bureau of the Budget and by the appropriate Congressional Committees.

In consequence of our being a literal part of the AEC we have been able to have the two most competent AEC reactor laboratories, the Bettis Lab at Pittsburgh operated by the Westinghouse Electric Corporation, and the KAPL Lab near Schenectady operated by General Electric, devoted almost entirely to naval atomic power plants. Without the use of these labs and the many hundreds of experienced reactor scientists and engineers it would not have been possible to make the progress we have made.

Our single group, operating for the two agencies renders it possible to make decisions quickly and with a minimum of red tape. We deal directly with laboratories, with manufacturers and with shipbuilders. Nearly all actions are taken by long distance telephone; we have special leased wires for our project - and the decisions can be confirmed later by letter.

An example of how we act rapidly is the manner in which we incorporate into the Nautilus such changes as have been found to be necessary as the result of operating experience on the submarine prototype at Arco. We have a Change Board consisting of three members, one from my organization, one from Westinghouse and one from Electric Boat. The three people meet once every two weeks, go over recommended changes and make final decisions on the spot, and that same day.

People. Everything in this world is done by or through people. If the proper people are obtained there is no other problem. It is a fallacy to believe that the head of an organization can delegate this responsibility to an employment manager or to a personnel manager. This may be possible in the case of clerical help, but is certainly not the case for officers and engineers.

The problem then becomes one of recruiting people who are more competent, or potentially more competent, than the head of the organization. This is the single most important responsibility of the administrator, and he cannot delegate it. The knowedge required for proper selection of people is knowledge of the deepest kind and which demands most of us. Knowledge of things or of logical propositions is much easier to acquire than knowledge of persons.

Officer Selection. We select between 4 and 6 officers each year and send them to MIT for a special course of 1 year in nuclear engineering. We have found from considerable experience that service records are only about 40 to 50% effective in judging an officer — because the records, as a rule, do not show motivation. An officer may have outstanding fitness reports, but not necessarily be fitted for scientific or technical work, or have that outlook which is essential to accomplish difficult tasks. Fitness reports are generally based on how well an officer does the particular job assigned to him. But they do not usually indicate that he is earnest in preparing himself for other more difficult or complex duties — in short that he has the necessary high degree of motivation for improving himself professionally. And the simple reason fitness reports do not show this is because few officers are so motivated.

Our practice is to select the most promising applicants, and have them come to Washington to be interviewed by a number of our people. For example, we recently selected 5 officers of 17 who came to Washington.

The 17 had what appeared to be the best records of about 40 who applied.

What I look for in an officer is a high degree of intelligence, enthusiasm, willingness to accept responsibility, and the ability to carry through — to get things done on his own, and despite obstacles. Our work is so new, and so vast in its scope; it is increasing so rapidly, that we must have people who are capable of dedicating themselves to a cause without regard to the effort or the hours necessary.

We attempt to instill the idea of total responsibility in each individual — that he is personally responsible, not only for his own specific part of the job, but for everything we do. A true sense of responsibility once instilled in the individuals of an organization will, in a short time, make that organization stand out from its competitors to an extent impossible to achieve by mere technical or professional superiority.

This system has been in operation for 7 years; during this time I have never accepted an officer without an interview. The batting average based on performance is about 60%. This is much greater than is usually found in industry for similar important jobs. 25% would be considered very good. The younger the officer, the greater the chance he will make good. The older officers are, as a rule, already too much set in their habits of thought, and have become indoctrinated in routine ways of doing things. They are more likely to be unable to accept new outlooks and new ways.

Be the man ever so brilliant, if his prejudices have cast his thinking in a certain mold, so that he will not accept observations which are not in line with his restricted thinking, a chance nugget of an idea will remain as clay in his sight, and he will never discover its true value.

One of the characteristics of engineers which I have frequently observed, and which must be guarded against is the search for exact answers, and the feeling of frustration if the exact answer is not forthcoming. This probably stems from the many years of high school and college training where the answer is always to be found in the back of the book, and the feeling of elation which comes when, after trying several solutions, and looking furtively at the answer, the latest trial finally works.

Unfortunately, in real life there are no exact or final answers. In a job which must go ahead at a rapid pace we cannot withhold judgment "until all the facts are in". Rarely is all the evidence at hand. Decisions must be made, and action taken, before complete knowledge can be acquired.

I have for some time thought that a few of our present day ills stem from this childish faith in the existence of perfect answers. It requires a degree of maturity to realize that all solutions are partial ones.

When the researches of the Pythagoreans brought them face to face with irrational numbers, they were overwhelmed by the discovery. It contradicted the fundamental tenet of their philosophy that everything is rational.

This can be summed up by saying that regularity is abnormal, and that the irregular is always more common than the regular.

In selecting civilian engineers I have come to the conclusion, after many years of experience, that I can do better by employing young men just out of college, and training them myself, than by hiring so-called experienced engineers who already know all the answers. Because of the interest in nuclear power I am able to employ the outstanding graduates of technical colleges. A number of us spend on the average a total of about 100 hours of interviewing for each young graduate finally selected. We consider this the single most important duty we have.

We select about 8 young graduates each year and send them to the Oak Ridge School of Reactor Technology for one year. Upon their return to us they are given just as much responsibility as they are able to handle. There is no limit to what they are allowed to do — as long as they do it well. It is entirely up to them. The job is so vast technically, and there are so many unsolved problems, that it is like a bottomless pit.

The training of our people goes on forever. Much of my time and that of my leading people is spent in personally pointing out errors. One thing that has impressed me about our Naval Service is the infrequency with which officers I worked for took time personally to explain my mistakes to me. I have always considered this a primary part of my duty — because it is the best way of transmitting what we know to those who follow us and who will have to assume our responsibilities.

This day-to-day personal attention is the essence of training. It is generally unpleasant, at the time, to the one who is being taught, because few people are able to accept criticism impersonally. And yet it is essential that the one who is being taught recognize that criticism is impersonal — that the criticism is of the act, or of a thing, and not of the person. This is a never-ending job, but it more than pays off. Unless one continually does this, unless he constantly trains others to do his work, he becomes completely limited and circumscribed.

The same mistake may have to be pointed out to the same individual 10 or 11 times, but if the lesson is learned the 11th time — that area of work can be relinquished forever — and one is free to go on to other things. In an organization where the work is expanding rapidly this procedure is essential. If an individual shows he cannot learn — if he cannot grasp new ideas, it is best to leave him go without too much delay. It is a truism that young men do not show greater promise as they grow older; therefore one will be disapplinted if, after a short time of trial, he expects radical improvement.

A man, by working 24 hours a day, could multiply himself 3 times. To multiply himself more than 3 times the only recourse is to train others to take over some of his work.

Some of the ideas I try to get across to the people who work with me are the following:

1. More than ambition, more than ability, it is rules that limit contribution; rules are the lowest common denominator of human behavior. They are a substitute for rational thought.
2. Sit down before fact with an open mind. Be prepared to give up every preconceived notion. Follow humbly wherever and to whatever abyss Nature leads, or you learn nothing. Don't push out figures when the facts are going in the opposite direction.
3. Free discussion requires an atmosphere unembarrassed by any suggestion of authority or even respect. If a subordinate always agrees with his superior he is a useless part of the organization. In this connection there is the story of Admiral Sims when he was on duty in London during World War I. He called a conscientious hard-working officer in to him to explain why he was dissatisfied

with the officer's work. The officer blushed and stammered when Sims pointed out that in all the time they had been together the officer had never once disagreed with Sims.

4. All men are by nature conservative but conservatism in the military profession is a source of danger to the country. One must be ready to change his line sharply and suddenly, with no concern for the prejudices and memories of what was yesterday. To rest upon a formula is a slumber that, prolonged, means death.
5. Success teaches us nothing; only failure teaches.
6. Do not regard loyalty as a personal matter. A greater loyalty is one to the Navy or to the Country. When you know you are absolutely right, and when you are unable to do anything about it, complete military subordination to rules becomes a form of cowardice.
7. To doubt one's own first principles is the mark of a civilized man. Don't defend past actions; what is right today may be wrong tomorrow. Don't be consistent; consistency is the refuge of fools.
8. Thoughts arising from "practical" experience may be a bridle or a spur.
9. Optimism and stupidity are nearly synonymous.
10. Avoid over-coordination. We have all observed months-long delay caused by an effort to bring all activities into complete agreement with a proposed policy or procedure. While the coordinating machinery is slowly grinding away, the original purpose is often lost, the essence of the proposal is being worn down, as the persons most concerned impatiently await the decision. This

process has been aptly called "coordinating to death".

A system under which it takes three men to check what one is doing is not control; it is systematic strangulation.

Technical Competence — In 1945, after the defeat of Germany we sent technical missions to Europe to learn what we could of the enemy war effort. Col. Leslie Simion who was at the U. S. Army Aberdeen Proving Grounds during the war was one of those sent to study the German technological effort. He reported that the German Air Force had been far superior to the German Army and Navy in science and in technology because the German Air Force had available at their headquarters' organizations people who were equally competent as those in industry with whom they had to deal. As a result, it is safe to say that, considering the effort required and the limitation of men and materials, the German Air Force performed the outstanding development job in aircraft. The German Army and Navy on the other hand relied almost entirely on industry itself to do the job — and the result was a much poorer performance.

The lesson from this is that a military agency which aspires to do a large development job, and rapidly, must have at its headquarters scientists and engineers just as competent as those who are doing the work in the field. Otherwise, the headquarters is at the mercy of the field and becomes essentially an agency for merely supplying the necessary funds and rubber stamping the technical decisions.

(Example of Westinghouse, S. Phila. — jet engines)

Technical decisions in the nuclear power game are made jointly by the members of my organization and by those in the field. There has never yet been an instance where we have had to order anything to be done. We argue things out, and finally a common decision is reached.

The relations we maintain with the laboratories and the many industrial organizations with whom we work is one of complete informality. In dealing with industry one must always bear in mind that getting along well is a give and take proposition. One cannot constantly chide a contractor in small matters, and then expect him to meet sudden large demands with enthusiasm. The contractor must be given the feeling he "belongs", that he is an equal member of a team, and he will be treated fairly. As far as I personally am concerned, I consider that I am just as responsible for the welfare and training of the men and women of the organizations which do work for us as I am for those in my own organization.

Responsibility — One of the major difficulties in getting things done in a large organization is the fact that it is practically impossible to pin-point responsibility. A Bureau or an Office can't be made responsible because, as I said before, they are inanimate and therefore are incapable of perception or of feeling. Limited tours of duty of two or three years in positions of responsibility accentuate this situation.

I have attempted to solve this problem of responsibility by assigning to each project an officer whom I hold personally responsible to me for the entire project. It is up to him to use whatever means he has to in order to get it done. For example, there is a project officer for the Nautilus, one for the Sea Wolf, one for the Central Station Nuclear Power Plant, and so on. These officers are kept on duty for 5, 6, or 7 years — as long as necessary. In this way I achieve permanence and responsibility. It is futile to imagine that an individual can take charge of a highly technical project, stay two or three years and then leave, and really contribute anything. If this were true then the system used by American industry is wrong. With the geometrical advance in science and in engineering it behooves us, the military, to recognize that an officer can no longer be master of many skills, and that a considerable period of learning and of training is essential if one is to be more than a pure administrator. And I submit there is no such thing as a pure administrator. A man must have technical competence in what he is administering; this is the only way he can assume true leadership and make real contributions.

Administration — The administration of a complex development program cannot follow any rule book. The fact that it is development at once defines it as a search or a groping for knowledge which is beyond our horizons. If known rules or known technology would serve to solve the problem — it would no longer, by definition, be developmental.

Therefore, the true test of an administrator for developmental or new work is his ability to concert and release the energies of those who work with him. Followed faithfully, the strict organizational approach, with its faith in channels, job descriptions and organizational charts, chokes vitality, stifles imagination and deadens creativity. It plays safe with administration and, while it ho doubt insures against abysmal failure, it also insures against brilliant success. . . .

The technique we use might be called "indefinite jurisdiction", but it often provides a testing of initiative, competence, and imagination which produces far better results than playing safe by the book.

I could go on at length on a subject of this kind. By this time all of you should have recognized that I am talking from the viewpoint of one who is enthusiastic about his own work.

A fitting close to this talk is the following extract from a letter I recently received from an executive of one of our large industrial organizations:

"What I find most exciting is that your job establishes a new concept in industrial operations, a concept of an operation which is neither straight technology nor scientific research, but a combination of both. It seems to me this concept is going to set the pattern of the things to come, since the day of the scientist in his ivory tower on the one hand, and an industrial operation exploiting "practical" inventions on the other hand, is over.

Both technology and science are rapidly becoming so complex that no one can predict what will be "practical", and one scientific discovery requires many others before it can be made to serve humanity.

Consequently a successful industrial executive of tomorrow will be one who can make scientists and engineers work side by side, in harmony, as one team — one who will have the practical judgment and the organizing ability to interpret and handle creative temperaments.

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STATEMENT

OF

ADMIRAL H. G. RICKOVER, USN

DIRECTOR

NAVAL NUCLEAR PROPULSION PROGRAM

BEFORE THE

SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

MAY 24, 1979

NOTE: NOT FOR PUBLIC RELEASE UNTIL RELEASED BY THE COMMITTEE ON SCIENCE AND TECHNOLOGY

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ADMIRAL H. G. RICKOVER, USN
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YOU HAVE ASKED ME TO APPEAR BEFORE YOUR SUBCOMMITTEE IN ORDER TO DISCUSS MY OWN PERSPECTIVE ON NUCLEAR SAFETY AND TO DESCRIBE THE PHILOSOPHY AND APPROACH OF THE NAVAL REACTOR SAFETY PROGRAM. THE VIEWS I WILL EXPRESS ARE MY OWN BASED ON 60 YEARS OF GOVERNMENT SERVICE. THEY DO NOT NECESSARILY REFLECT THOSE OF MY SUPERIORS OF ANY GOVERNMENT AGENCY.

NAVAL REACTORS PROGRAM

I WILL BEGIN BY DESCRIBING THE EXTENT OF THE NAVAL REACTORS PROGRAM. TODAY 115 NUCLEAR POWERED SUBMARINES ARE IN OPERATION; 41 OF THESE ARE BALLISTIC MISSILE FIRING SUBMARINES AND 74 ARE ATTACK SUBMARINES. TWENTY-THREE ADDITIONAL ATTACK SUBMARINES AND SEVEN TRIDENT SUBMARINES ARE AUTHORIZED FOR CONSTRUCTION. WE ALSO HAVE ONE NUCLEAR POWERED DEEP SUBMERGENCE RESEARCH AND OCEAN ENGINEERING VEHICLE. THREE NUCLEAR POWERED AIRCRAFT CARRIERS ARE IN OPERATION, AND ONE MORE IS BEING BUILT. EIGHT NUCLEAR

POWERED CRUISERS ARE IN OPERATION, AND ONE MORE IS BEING BUILT. ALTOGETHER, 127 NUCLEAR POWERED SHIPS ARE IN OPERATION. IN ADDITION, I AM RESPONSIBLE FOR THE SHIPPINGPORT ATOMIC POWER STATION. INCLUDING NUCLEAR SHIPS, THE NAVAL PROTOTYPE REACTORS, AND THE SHIPPINGPORT STATION, I AM RESPONSIBLE FOR THE OPERATION OF 153 REACTORS.

THERE ARE TWO DEPARTMENT OF ENERGY LABORATORIES DEVOTED TO THE SUPPORT OF THE NAVAL REACTORS PROGRAM: ONE IS THE BETTIS ATOMIC POWER LABORATORY IN PITTSBURGH, PENNSYLVANIA WHICH IS OPERATED BY WESTINGHOUSE; THE OTHER IS THE KNOLLS ATOMIC POWER LABORATORY LOCATED IN SCHENECTADY, NEW YORK, WHICH IS OPERATED BY THE GENERAL ELECTRIC COMPANY.

SINCE THE USS NAUTILUS FIRST PUT TO SEA IN 1955, NAVAL NUCLEAR POWERED SHIPS HAVE STEAMED OVER 40 MILLION MILES AND HAVE ACCUMULATED OVER 1800 REACTOR-YEARS OF OPERATION. WE HAVE PROCURED 508 NUCLEAR CORES, AND HAVE PERFORMED 166 REFUELINGS. SOME 300 LARGE BUSINESSES AND OVER 1000 SMALL BUSINESSES PRODUCE EQUIPMENT FOR THE NAVAL REACTORS PROGRAM.

ENVIRONMENTAL RECORD

IN THE TWENTY-SIX YEARS SINCE THE NAUTILUS LAND PROTOTYPE FIRST OPERATED THERE HAS NEVER BEEN AN ACCIDENT INVOLVING A NAVAL REACTOR, NOR HAS THERE BEEN ANY RELEASE OF RADIOACTIVITY

WHICH HAS HAD A SIGNIFICANT EFFECT ON THE ENVIRONMENT. FOR EXAMPLE, IN EACH OF THE LAST EIGHT YEARS, THE TOTAL GAMMA RADIOACTIVITY IN LIQUIDS, LESS TRITIUM, DISCHARGED WITHIN 12 MILES OF SHORE FROM ALL OUR NUCLEAR POWERED SHIPS, SUPPORTING TENDERS, NAVAL BASES AND NINE SHIPYARDS, WAS LESS THAN TWO THOUSANDTHS OF A CURIE. IF ONE PERSON WERE ABLE TO DRINK THE ENTIRE AMOUNT OF RADIOACTIVITY DISCHARGED INTO ANY HARBOR IN 1978, HE WOULD NOT EXCEED THE ANNUAL RADIATION EXPOSURE PERMITTED BY THE NUCLEAR REGULATORY COMMISSION FOR AN INDIVIDUAL WORKER.

EACH YEAR I ISSUE A REPORT WHICH DESCRIBES IN DETAIL THE RECORD OF DISCHARGES OF RADIOACTIVITY TO THE ENVIRONMENT FROM NAVAL SHIP OPERATIONS AND DESCRIBES OUR METHODS OF CONTROL AND ENVIRONMENTAL MONITORING. WITH YOUR PERMISSION I WILL PROVIDE THE SUBCOMMITTEE WITH A COPY OF THIS REPORT FOR 1978 FOR THE RECORD.

OCCUPATIONAL RADIATION EXPOSURE

FOR THE PAST TWO YEARS THERE HAS BEEN INCREASED PUBLIC AND CONGRESSIONAL INTEREST IN THE HEALTH EFFECTS DUE TO LOW LEVEL RADIATION. I AM NEITHER AN EXPERT ON RADIATION HEALTH EFFECTS NOR AM I RESPONSIBLE FOR SETTING THE NATIONAL OCCUPATIONAL EXPOSURE LIMITS. BUT I AM RESPONSIBLE FOR THE USE OF THESE

STANDARDS IN CONDUCTING RADIOACTIVE WORK IN THE NAVAL REACTORS PROGRAM. THUS I HAVE CONSIDERABLE EXPERIENCE IN WHAT IT TAKES TO PERFORM WORK WITH RADIOACTIVE MATERIAL IN A MANNER THAT PROTECTS THE WORKERS.

A SECOND DOCUMENT I WOULD LIKE TO PROVIDE FOR THE RECORD PROVIDES THE OCCUPATIONAL RADIATION EXPOSURE RECORD FOR CIVILIAN AND MILITARY PEOPLE INVOLVED IN NAVY NUCLEAR PROPULSION AND THEIR SUPPORT FACILITIES. ON PAGE 2 OF THIS REPORT, THERE IS A GRAPH WHICH SHOWS THE TOTAL OCCUPATIONAL RADIATION EXPOSURES TO PERSONNEL OPERATING SHIPS AND TO EMPLOYEES IN THE SHIPYARDS. IN 1978 THE TOTAL OPERATOR AND WORKER EXPOSURE WAS ABOUT ONE QUARTER THE AMOUNT IN THE PEAK YEAR 1966, EVEN THOUGH THE NUMBER OF NUCLEAR-POWERED SHIPS NEARLY DOUBLED.

AS IDENTIFIED IN THE DOCUMENT, SINCE 1967 NO CIVILIAN OR MILITARY PERSONNEL IN THE NAVY'S NUCLEAR PROPULSION PROGRAM HAVE EXCEEDED THE QUARTERLY FEDERAL LIMIT OF 3 REM OR AN ANNUAL RADIATION EXPOSURE LIMIT OF 5 REM. THE AVERAGE ANNUAL EXPOSURE OF SHIPYARD WORKERS IN 1978 WAS ONE QUARTER OF A REM. THE AVERAGE ANNUAL EXPOSURE OF SHIP OPERATORS IN 1978 WAS ONE TENTH OF A REM. THIS DOCUMENT ALSO OUTLINES MANY OF THE MEASURES IMPLEMENTED TO ACHIEVE THE RECORD OF OCCUPATIONAL RADIATION EXPOSURE WE HAVE ATTAINED.

I BELIEVE BOTH REPORTS WILL BE OF VALUE TO THE PURPOSE OF THIS HEARING, BECAUSE THEY CONVEY SOMETHING OF THE KIND OF CARE AND ATTENTION TO DETAIL WE HAVE TAKEN IN ORDER TO MAINTAIN A LEVEL OF ASSURANCE THAT BOTH THE PUBLIC AND THE PEOPLE IN THE PROGRAM ARE PROTECTED.

THREE MILE ISLAND INCIDENT

SINCE THE INCIDENT AT THE THREE MILE ISLAND SITE, I HAVE BEEN ASKED BY MANY PEOPLE TO COMMENT. THERE ARE SEVERAL REASONS WHY I HAVE NOT DONE THIS. FIRST, ALL THE FACTS ARE NOT IN, AND IT WOULD BE PRESUMPTUOUS ON MY PART TO MAKE JUDGMENTS ON SUCH A HIGHLY COMPLEX SUBJECT WHEN I DO NOT HAVE THE FACTS. SECOND, THERE ARE SIGNIFICANT DIFFERENCES BETWEEN THE DESIGN AND OPERATION OF NAVAL REACTORS AND PLANTS SUCH AS THE THREE MILE ISLAND PLANT. I WANT TO WEIGH ALL ASPECTS OF THE INCIDENT AND SEE IF THERE IS ANYTHING FROM IT I CAN LEARN AND INCORPORATE INTO THE NAVAL PROGRAM. THAT IS THE WAY I HAVE ALWAYS OPERATED.

ANOTHER IMPORTANT ASPECT IS THE LEGAL ISSUE INVOLVED. IT IS YET TO BE DECIDED WHO WILL PAY ALL THE VARIOUS COSTS FOR THE INCIDENT. IT WOULD NOT BE APPROPRIATE FOR A GOVERNMENT EMPLOYEE SUCH AS MYSELF TO BE ISSUING PRONOUNCEMENTS ON THE INCIDENT WHEN THERE MAY BE LITIGATION.

BASIC PRINCIPLES OF NAVAL REACTORS PROGRAM

THERE ARE, HOWEVER, A NUMBER OF FACTS WHICH HAVE BEEN RELEASED BY THE NUCLEAR REGULATORY COMMISSION REGARDING THREE MILE ISLAND. THESE FACTS SEEM TO ME TO REINFORCE MANY OF THE UNDERLYING BASIC PRINCIPLES OF THE NAVAL REACTORS PROGRAM.

OVER THE YEARS, MANY PEOPLE HAVE ASKED ME HOW I RUN THE NAVAL REACTORS PROGRAM, SO THAT THEY MIGHT FIND SOME BENEFIT FOR THEIR OWN WORK. I AM ALWAYS CHAGRINED AT THE TENDENCY OF PEOPLE TO EXPECT THAT I HAVE A SIMPLE, EASY GIMMICK THAT MAKES MY PROGRAM FUNCTION. THEY ARE DISAPPOINTED WHEN THEY FIND OUT THERE IS NONE. ANY SUCCESSFUL PROGRAM FUNCTIONS AS AN INTEGRATED WHOLE OF MANY FACTORS. TRYING TO SELECT ONE ASPECT AS THE KEY ONE WILL NOT WORK. EACH ELEMENT DEPENDS ON ALL THE OTHER ELEMENTS.

I RECALL ONCE SEVERAL YEARS AGO AN ADMIRAL, WHOSE CONVENTIONALLY POWERED SHIPS WERE SUFFERING SERIOUS ENGINEERING

PROBLEMS, ASKED ME FOR A COPY OF ONE SPECIFIC PROCEDURE I USED TO IDENTIFY EQUIPMENT WHICH WAS NOT OPERATING PROPERLY. HE BELIEVED THAT WOULD SOLVE HIS PROBLEM, BUT IT DID NOT. THAT ADMIRAL DID NOT HAVE THE VAGUEST UNDERSTANDING OF THE PROBLEM OR HOW TO SOLVE IT, HE WAS MERELY SEARCHING FOR A SIMPLE ANSWER, A CHECK OFF LIST, THAT HE HOPED WOULD MAGICALLY SOLVE HIS PROBLEM.

I CANNOT OVEREMPHASIZE THE IMPORTANCE OF THIS THOUGHT IN YOUR CURRENT DELIBERATIONS. THE PROBLEMS YOU FACE CANNOT BE SOLVED BY SPECIFYING COMPLIANCE WITH ONE OR TWO SIMPLE PROCEDURES. REACTOR SAFETY REQUIRES ADHERENCE TO A TOTAL CONCEPT WHEREIN ALL ELEMENTS ARE RECOGNIZED AS IMPORTANT AND EACH IS CONSTANTLY REINFORCED.

TECHNICAL COMPETENCE

ONE OF THE ELEMENTS NEEDED IN SOLVING A COMPLEX TECHNICAL PROBLEM IS TO HAVE THE INDIVIDUALS WHO MAKE THE DECISIONS TRAINED IN THE TECHNOLOGY INVOLVED. A CONCEPT WIDELY ACCEPTED IN SOME CIRCLES IS THAT ALL YOU NEED IS TO GET A COLLEGE DEGREE IN MANAGEMENT AND THEN, REGARDLESS OF THE TECHNICAL SUBJECT, YOU CAN APPLY YOUR MANAGEMENT TECHNIQUES TO RUN ANY PROGRAM; INCLUDING THE PRESIDENCY, CONGRESS, OR THE VATICAN. THIS HAS BECOME A TENET OF OUR MODERN SOCIETY, BUT IT IS AS VALID AS THE ONCE WIDELY HELD PRECEPT THAT THE WORLD IS FLAT. PROPERLY RUNNING A SOPHISTICATED TECHNICAL PROGRAM REQUIRES A FUNDAMENTAL UNDERSTANDING OF AND COMMITMENT TO THE TECHNICAL ASPECTS OF THE JOB AND A WILLINGNESS TO PAY INFINITE ATTENTION TO THE TECHNICAL DETAILS. THIS CAN ONLY BE DONE BY ONE WHO UNDERSTANDS THE DETAILS AND THEIR IMPLICATIONS. THE PHRASE "THE DEVIL IS IN THE DETAILS" IS ESPECIALLY TRUE FOR TECHNICAL WORK. IF YOU IGNORE THOSE DETAILS AND ATTEMPT TO RELY ON MANAGEMENT TECHNIQUES OR GIMMICKS YOU WILL SURELY END UP WITH A SYSTEM THAT IS UNMANAGEABLE, AND PROBLEMS WILL BE IMMENSELY MORE DIFFICULT TO SOLVE. AT NAVAL REACTORS, I TAKE INDIVIDUALS WHO ARE GOOD ENGINEERS AND MAKE THEM INTO MANAGERS. THEY DO NOT MANAGE BY GIMMICKS BUT RATHER BY KNOWLEDGE, LOGIC, COMMON SENSE, AND HARD WORK.

RESPONSIBILITY

ANOTHER ESSENTIAL ELEMENT IS THAT OF RESPONSIBILITY. IN THE BEGINNING OF THE NAVAL PROGRAM IT WAS APPARENT TO ME THAT DUE TO THE UNIQUENESS OF NUCLEAR POWER AND ITS POTENTIAL EFFECT ON PUBLIC SAFETY, A NEW CONCEPT OF TOTAL RESPONSIBILITY HAD TO BE ESTABLISHED BOTH WITHIN THE NAVY AND THE THEN ATOMIC ENERGY COMMISSION (AEC). IT WOULD NOT WORK IF ONE PERSON WAS RESPONSIBLE FOR NUCLEAR POWER PLANTS IN THE NAVY, AND A DIFFERENT PERSON RESPONSIBLE IN THE AEC. SIMILARLY, IT WOULD NOT WORK IF THERE WAS ONE PERSON IN THE THE AEC

RESPONSIBLE FOR THE NAVAL PROGRAM WITH A DIFFERENT PERSON RESPONSIBLE FOR THE AEC LABORATORIES DOING THE WORK FOR THE NAVAL REACTOR PROGRAM. IT WOULD NOT WORK IN THE NAVY IF FIVE OR SIX DIFFERENT ADMIRALS ALL HAD CHARGE OF DIFFERENT PIECES OF THE PROGRAM, AS IS OFTEN THE CASE IN OTHER AREAS. IT WOULD NOT WORK IF THERE WAS ONE PERSON RESPONSIBLE FOR RESEARCH AND DEVELOPMENT, SOMEONE ELSE RESPONSIBLE FOR CONSTRUCTION, AND ANOTHER RESPONSIBLE FOR TRAINING AND OPERATION, AND STILL ANOTHER FOR REPAIR WORK.

THIS KIND OF COMPARTMENTALIZATION OF RESPONSIBILITY IS TYPICAL IN GOVERNMENT WORK, BUT THE PRACTICE OF HAVING SHARED RESPONSIBLITY REALLY MEANS THAT NO ONE IS RESPONSIBLE. IT REMINDS ME OF THE FIGURE IN NAST'S CARTOON OF THE TWEED RING, WHERE ALL OF THE CHARACTERS STAND IN A CIRCLE, EACH ONE POINTING HIS THUMB AT HIS NEIGHBOR AS THE RESPONSIBLE PERSON. UNLESS YOU CAN POINT YOUR FINGER AT THE ONE PERSON WHO IS RESPONSIBLE WHEN SOMETHING GOES WRONG, THEN YOU HAVE NEVER HAD ANYONE REALLY RESPONSIBLE.

FOR THESE REASONS, I DID ALL I COULD TO GAIN SUPPORT FOR MY CONCEPT OF TOTAL RESPONSIBILITY. IT REQUIRED THAT A SINGLE POSITION BE ESTABLISHED TO HANDLE BOTH THE NAVY AND THE AEC PARTS OF THE JOB. I THINK IT MIGHT BE OF VALUE TO THIS SUBCOMMITTEE TO OUTLINE HOW THIS DESIGNATION OF RESPONSIBILITY WAS DERIVED FROM THE ATOMIC ENERGY ACT OF 1954, AND HOW IT

IS CARRIED OUT ALL THE WAY DOWN TO THE SHIPS, WHETHER IN CONSTRUCTION, OPERATION, OR OVERHAUL. I HAVE SUCH AN OUTLINE AND WITH YOUR PERMISSION I WOULD LIKE TO INCLUDE IT IN THE RECORD WITH MY STATEMENT.

I CAN ASSURE YOU THAT HAVING ONLY ONE INDIVIDUAL RESPONSIBLE FOR A TOTAL PROGRAM IS A UNIQUE CONCEPT WITHIN THE DEPARTMENT OF DEFENSE. I WANT TO EMPHASIZE THAT THROUGHOUT THIS ENTIRE PERIOD OF OVER THIRTY YEARS I HAVE HAD FULL SUPPORT FROM THE CONGRESS, MAINLY THROUGH THE FORMER JOINT COMMITTEE ON ATOMIC ENERGY AND THE ARMED SERVICES AND APPROPRIATIONS COMMITTEES, AND FROM THE ATOMIC ENERGY COMMISSION AND ITS SUCCESSORS, THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION AND NOW THE DEPARTMENT OF ENERGY. I HAVE NOT HAD SUCH CONSISTENT SUPPORT FROM THE NAVY OR THE DEPARTMENT OF DEFENSE.

FACING THE FACTS

ANOTHER PRINCIPLE FOR SUCCESSFUL APPLICATION OF A SOPHISTICATED TECHNOLOGY IS TO RESIST THE HUMAN INCLINATION TO HOPE THAT THINGS WILL WORK OUT, DESPITE EVIDENCE OR SUSPICIONS TO THE CONTRARY. THIS MAY SEEM OBVIOUS, BUT IT IS A HUMAN FACTOR YOU MUST BE CONSCIOUS OF AND ACTIVELY GUARD AGAINST. IT CAN AFFECT YOU IN SUBTLE WAYS, PARTICULARLY WHEN YOU HAVE SPENT A LOT OF TIME AND ENERGY ON A PROJECT AND FEEL PERSONALLY RESPONSIBLE FOR IT, AND THUS SOMEWHAT POSSESSIVE. IT IS A COMMON HUMAN PROBLEM AND IT IS NOT EASY

TO ADMIT WHAT YOU THOUGHT WAS CORRECT DID NOT TURN OUT THAT WAY.

IF CONDITIONS REQUIRE IT, YOU MUST FACE THE FACTS AND BRUTALLY MAKE NEEDED CHANGES DESPITE SIGNIFICANT COSTS AND SCHEDULE DELAYS. THERE HAVE BEEN A NUMBER OF TIMES DURING THE COURSE OF MY WORK THAT I HAVE MADE DECISIONS TO STOP WORK AND REDESIGN OR REBUILD EQUIPMENT TO PROVIDE THE NEEDED HIGH DEGREE OF ASSURANCE OR SATISFACTORY PERFORMANCE. THE PERSON IN CHARGE MUST PERSONALLY SET THE EXAMPLE IN THIS AREA AND REQUIRE HIS SUBORDINATES TO DO LIKEWISE.

I WILL NOW DISCUSS IN GREATER DETAIL THE UNDERLYING BASIC PRINCIPLES OF THE NAVAL REACTORS PROGRAM.

PRINCIPLES OF DESIGN AND ENGINEERING

FROM THE VERY BEGINNING OF THE NAVAL NUCLEAR PROPULSION PROGRAM I RECOGNIZED THAT THERE WERE A LARGE NUMBER OF ENGINEERING PROBLEMS IN PUTTING A NAVAL REACTOR INTO A SUBMARINE. SOME PROBLEMS WERE UNIQUE TO SUBMARINE APPLICATION, AND SOME TO THE GENERAL PROBLEM OF MAKING A REACTOR PLANT WORK. I REALIZED AT THE TIME THAT THE USE OF NUCLEAR POWER, AS WITH ANY NEW SOPHISTICATED TECHNOLOGY, WOULD REQUIRE THE INSTITUTION OF NOVEL REQUIREMENTS AND STANDARDS. I REALIZED THAT THESE REQUIREMENTS WOULD NECESSARILY BE DIFFICULT TO MEET, AND THE STANDARDS WOULD NEED TO BE MORE STRINGENT THAN

THOSE WHICH HAD BEEN USED IN POWER PLANTS UP TO THAT TIME. BUT WHEN YOU ARE AT THE FRONTIERS OF SCIENCE YOU MUST BE PREPARED TO ACCEPT THE DISCIPLINE THIS REQUIRES IN ORDER TO PROCEED. THE FACT THAT THE APPLICATION OF NUCLEAR POWER WAS ALMOST ENTIRELY AN ENGINEERING PROBLEM - NOT A PROBLEM OF NUCLEAR PHYSICS, AS NEARLY ALL OF THE "EXPERTS" THEN BELIEVED - WAS CLEAR TO ME. THE EMPHASIS I HAVE PLACED ON SOUND, CONSERVATIVE ENGINEERING HAS BEEN A MAJOR FACTOR IN THE PERFORMANCE OF OUR PLANTS.

I SHOULD POINT OUT THAT IN THE LATE 1940'S AND EARLY 1950'S, WHEN THE ORIGINAL NAVAL NUCLEAR PROPULSION PLANT DESIGN STUDIES BEGAN THERE WERE NO STANDARDS, DESIGN GUIDES, OR CODES AVAILABLE. THEY HAD TO BE DEVELOPED. DUE TO THE MILITARY APPLICATION, THESE DESIGN CRITERIA INCLUDED CONSIDERATIONS OF RELIABILITY, BATTLE DAMAGE, HIGH SHOCK AND THE CLOSE PROXIMITY OF THE CREW TO THE REACTOR PLANT. THE PROPULSION PLANT DESIGN HAD TO BE READILY MAINTAINABLE SO POSSIBLE EQUIPMENT FAILURES AT SEA COULD BE REPAIRED. THE FACT THAT MAJOR MAINTENANCE OPERATIONS WOULD BE INFREQUENT AND REFUELING POSSIBLY AS SELDOM AS ONCE IN A SHIP'S LIFETIME, REQUIRED THAT STANDARDS FOR MATERIALS AND SYSTEMS BE VERY RIGOROUS AND THAT ONLY PREMIUM PRODUCTS WHICH HAD A PROVEN PEDIGREE COULD BE CONSIDERED FOR USE. MY DESIGN OBJECTIVE IS AND HAS BEEN TO PROVIDE A WARSHIP THAT CAN BE RELIED UPON TO PERFORM ITS MISSION, AND RETURN.

CONSERVATISM OF DESIGN

I WILL EXPLAIN SOME OF THE ELEMENTS OF GOOD ENGINEERING AS I HAVE APPLIED THEM TO THE REACTOR PLANTS FOR WHICH I AM RESPONSIBLE. FIRST, IN ANY ENGINEERING ENDEAVOR, AND PARTICULARLY IN AN ADVANCED FIELD SUCH AS NUCLEAR POWER, CONSERVATISM IS NECESSARY, SO AS TO ALLOW FOR POSSIBLE UNKNOWN AND UNFORESEEN EFFECTS. THIS CONSERVATISM MUST BE BUILT INTO THE DESIGN FROM THE VERY BEGINNING. IF THE BASIC DESIGN IS NOT CONSERVATIVE, IT QUICKLY BECOMES IMPRACTICABLE TO PROVIDE THE NEEDED CONSERVATISM. IT THEN BECOMES NECESSARY TO ADD COMPLEXITIES TO THE SYSTEM IN AN ATTEMPT TO COMPENSATE FOR THE INADEQUACIES OF THE BASIC DESIGN. THESE COMPLEXITIES, IN TURN, SERVE TO REDUCE CONSERVATISM AND RELIABILITY.

I MUST MAKE IT CLEAR THAT THE MILITARY REQUIREMENTS WHICH MUST BE MET BY NAVAL PROPULSION REACTORS ARE FAR MORE EXACTING THAN THOSE WHICH CENTRAL STATION PLANTS MUST ENDURE. FOR EXAMPLE, THE SHOCK LOADINGS FOR WHICH NAVAL PLANTS ARE DESIGNED ARE FAR GREATER THAN THE EARTHQUAKE SHOCK LOADINGS FOR CIVILIAN PLANTS. IN ADDITION, NAVAL PLANTS MUST BE ABLE TO ACCOMODATE POWER TRANSIENTS MUCH MORE RAPIDLY THAN CIVILIAN PLANTS. EACH NAVAL VESSEL DEPENDS ENTIRELY ON ITS OWN REACTOR PLANT FOR THE CAPABILITY TO PERFORM ITS MISSION. FOR A SHIP THERE IS NO INTER-CONNECTED GRID TO PICK UP THE LOAD AND ALLOW THE SHIP TO CONTINUE FUNCTIONING. THE STRINGENT

REQUIREMENTS OF OPERATING A SHIP AT SEA ARE REFLECTED IN A CONSERVATIVE DESIGN WITH A LARGE OVERALL DESIGN MARGIN IN ALMOST EVERY ELEMENT OF THE PLANT.

SOME SPECIFIC EXAMPLES OF THE CONSERVATISM IN DESIGN WHICH I HAVE USED ARE:

- USE OF ORDINARY WATER OF HIGH PURITY AS THE REACTOR COOLANT. WATER HAS BEEN WIDELY USED IN INDUSTRIAL APPLICATIONS; ITS PROPERTIES ARE WELL-KNOWN, AND WHEN IRRADIATED, HAS SHORT-LIVED RADIOACTIVITY.

- USE OF CONSERVATIVE LIMITS FOR SYSTEMS AND EQUIPMENT. DESIGN IS BASED ON THE WORST CREDIBLE SET OF CIRCUMSTANCES, RATHER THAN RELYING ON A STATISTICAL APPROACH WHICH DEALS IN AVERAGE OR PROBABLE CONDITIONS.

- PROVISION IN THE DESIGN FOR REDUNDANCY SO THAT FAILURE OF ONE COMPONENT, OR ONE PORTION OF A SYSTEM, WILL NOT RESULT IN SHUTTING THE PLANT DOWN, OR IN DAMAGE TO THE REACTOR.

- DESIGN OF THE REACTOR PLANT TO ENABLE IT TO ACCOMODATE EXPECTED TRANSIENTS, WITHOUT THE NEED FOR IMMEDIATE OPERATOR ACTION. THIS MEANS THE PLANT IS INHERENTLY STABLE, AND HELPS THE OPERATOR WHEN THERE IS AN UNUSUAL TRANSIENT.

- SIMPLE SYSTEM DESIGN, SO THAT MINIMUM RELIANCE NEED BE PLACED ON AUTOMATIC CONTROL. RELIANCE IS PRIMARILY PLACED ON DIRECT OPERATOR CONTROL.

- SELECTION OF MATERIALS WITH WHICH THERE IS KNOWN EXPERIENCE FOR THE TYPE OF APPLICATION INTENDED, AND WHICH, INSOFAR AS PRACTICABLE, DO NOT REQUIRE SPECIAL CONTROLS FOR PROCUREMENT, FABRICATION, AND MAINTENANCE WHICH COULD LEAD TO PROBLEMS IF NOT PROPERLY ACCOMPLISHED.

- USE OF A LAND-BASED PROTOTYPE OF THE SAME DESIGN AS THE SHIPBOARD PLANT. THIS PROTOTYPE PLANT CAN BE TESTED AND SUBJECTED TO THE POTENTIAL TRANSIENTS A SHIPBOARD PLANT WILL EXPERIENCE, PRIOR TO OPERATION OF THE SHIPBOARD PLANT.

- USE OF EXTENSIVE ANALYSES, FULL SCALE MOCKUPS, AND TESTS TO CONFIRM THE DESIGN.

- STRICT CONTROL OF MANUFACTURE OF ALL EQUIPMENT, INCLUDING EXTENSIVE INSPECTIONS BY SPECIALLY TRAINED INSPECTORS DURING THE COURSE OF MANUFACTURE AND ON THE FINISHED EQUIPMENT. THIS MEANS THAT AT MANY POINTS DURING THE MANUFACTURE AN INDEPENDENT CHECK IS REQUIRED, WITH SIGNED CERTIFICATION THAT THE STEP HAS BEEN COMPLETED PROPERLY.

- Providing extensive detailed operating procedures and manuals, prepared and approved by technical people knowledgeable of the plant design. These manuals are constantly updated as we learn from the operations of the many other reactors. What we learn on one plant is incorporated into all our plants.

- Placing particular attention on designing, building and operating the plant so as to prevent accidents, and thus avoid undue reliance on the systems and procedures provided to cope with accidents which could occur.

- Use of frequent, thorough, and detailed audits of all aspects of the program by individuals who are specifically selected and trained.

- Use of formal documentation for design decisions, manufacturing procedures, inspection requirements, and inspection results.

- In addition to the detailed technical review and approval by my office, the safety aspects of operation of naval nuclear powered ships are independently reviewed by the Nuclear Regulatory Commission and the Advisory Committee on Reactor Safeguards.

APPROACH TO NEW REACTORS

THE KIND OF ENGINEERING APPROACH I HAVE JUST OUTLINED IS, IN MY OPINION, WHY THE NAVAL REACTORS PROGRAM HAS RESULTED IN SAFE, RELIABLE NUCLEAR POWER. TO THE CASUAL READER MUCH OF WHAT I HAVE SAID MAY APPEAR OBVIOUS. BUT I ASSURE YOU IT IS NOT WHEN YOU TRY TO CARRY OUT THESE CONCEPTS IN EVERYDAY WORK. I HAVE ENCOUNTERED MANY CASES WHERE THESE IDEAS ARE IGNORED OR NOT UNDERSTOOD. I HAVE, ON MANY OCCASIONS, REVIEWED PROPOSALS FOR SMALLER, LIGHTER, AND CHEAPER REACTORS. WHILE SUCH PROPOSALS HAVE COVERED A WIDE VARIETY OF REACTOR CONCEPTS, THEY HAVE BEEN COMPLETELY CONSISTENT IN ONE RESPECT; THEY HAVE ALL INVOLVED THE SACRIFICE OF SOUND, CONSERVATIVE ENGINEERING TO ACHIEVE A DESIGN THEORETICALLY HAVING BETTER PERFORMANCE. THEY EACH VIOLATED MOST, IF NOT ALL OF THE ENGINEERING PRINCIPLES I HAVE JUST DISCUSSED. THEY WOULD ALL HAVE BEEN, IN MY OPINION, UNSAFE AND UNSATISFACTORY FOR NAVAL WARSHIP APPLICATION. HOW OFTEN HAVE YOU KNOWN OF CASES WHERE IN THE FERVOR OF WINNING CONTRACTS, FIRMS WILL PROMISE ALL KINDS OF PERFORMANCE, ONLY TO BE FOUND INCAPABLE OF DELIVERING IT WHEN THEY TRY TO MAKE THE EQUIPMENT WORK. BY THIS, I DO NOT MEAN WE SHOULD NOT MAKE IMPROVEMENTS. WE HAVE. BUT AT ALL STAGES YOU MUST PROCEED IN ACCORDANCE WITH SOUND, CONSERVATIVE ENGINEERING PRACTICES IF YOU ARE TO PRODUCE SOMETHING THAT WILL WORK, VICE SOMETHING THAT IS JUST AN EXPENSIVE PIECE OF UNRELIABLE AND UNSAFE JUNK.

As an example, I have often been pressed to reduce radiation shielding to make new ships smaller and lighter. However, if I removed 100 tons of radiation shielding from a typical submarine, the ship would be only two percent lighter. But the radiation exposures to ship personnel would increase to ten times the current levels. I have not agreed to reducing shielding because I believe radiation exposure to personnel should be as low as I can reasonably obtain.

NAVAL NUCLEAR TRAINING

Another element in my approach to safe operation of naval reactor plants involves the selection and training of the operators. In brief, I consider the training of officers and men to be at least as important as any other element of the Navy Nuclear Power Program. I consider it of the greatest importance that the mental abilities, qualities of judgment, and level of training, be commensurate with the responsibility involved in operating a nuclear reactor. The selection of personnel and their training in the Naval Nuclear Power Program are carried out with these considerations in mind.

Academic ability, personal character as demonstrated by any acts reflecting unreliability, and honest desire for the nuclear program are all taken into account in selection of personnel. Once selected for the Naval Nuclear Power Program, the individual is continually subject to review.

To accomplish these objectives, I require a one year training period prior to an operator going on board his first nuclear ship. The first six months of nuclear power training are spent at Nuclear Power School in Orlando, Florida, where the curriculum concentrates on the theoretical basis for shipboard systems. Upon graduation from Nuclear Power School the student reports to one of our land-based prototype plants where he learns to actually operate the propulsion plant. There the student must demonstrate that he can operate the plant under normal and casualty conditions, and is taught to operate in strict compliance with detailed operating and casualty procedures.

I established the Naval Nuclear Power Training Program on a base of rigid high standards. My staff at Naval Reactors approves the curriculum at Nuclear Power School and the qualification guides used to develop the prototype and shipboard operator qualification programs. This ensures that the standards are not reduced by someone who does not understand the overall goals of the program, and that the individuals responsible for the design and construction of the reactor plant systems are involved in the training considerations on that system.

The methods we use in training involve lectures, seminars, homework assignments and both oral and written examinations.

WE ALSO REQUIRE OPERATORS TO BE ABLE TO DEMONSTRATE THEIR PRACTICAL KNOWLEDGE IN ORDER TO BECOME QUALIFIED AT THE LAND-BASED PROTOTYPE. THESE INDIVIDUALS MUST SUBSEQUENTLY QUALIFY ON BOARD SHIP. I AM NOT SATISFIED WITH BRINGING AN OPERATOR TO A QUALIFIED LEVEL ONCE, AND THEN FORGETTING ABOUT HIM. THEREFORE, WE CONTINUALLY REINFORCE THEORETICAL AND PRACTICAL TRAINING WITH A CONTINUING TRAINING PROGRAM. THIS INCLUDES FREQUENT PRACTICE IN PLANT EVOLUTIONS AND CASUALTY DRILLS.

THE EXAMINATIONS GIVEN MUST BE TOUGH, AND MUST BE APPROVED BY A COMPETENT PERSON IN AUTHORITY. INSTRUCTORS ARE TRAINED SO THAT THEY ARE CAPABLE OF CORRECTLY INSTRUCTING THE STUDENT. INSTRUCTORS, AS WELL AS STUDENTS, ARE MONITORED.

INSPECTIONS OF PERSONNEL IN THE FLEET ARE CONDUCTED BY MEMBERS OF MY STAFF, BOTH THOSE IN THE FIELD AND FROM HEADQUARTERS; BY THE FLEET NUCLEAR PROPULSION EXAMINING BOARDS ESTABLISHED BY THE CHIEF OF NAVAL OPERATIONS; AND BY NUCLEAR TRAINED PERSONNEL ON VARIOUS OTHER NAVAL STAFFS. I REVIEW THE RESULTS OF ALL THEIR INSPECTIONS.

I HAVE ESTABLISHED A FORMAL SYSTEM OF REPORTING PROPULSION PLANT PROBLEMS WHICH IDENTIFIES AREAS WHICH NEED IMPROVEMENT IN THE TRAINING PROGRAM. I ALSO REQUIRE THE COMMANDING OFFICER OF EACH NUCLEAR POWERED SHIP TO WRITE ME PERIODICALLY

CONCERNING PROPULSION PLANT PROBLEMS. THESE LETTERS CONTAIN A SUMMARY OF THE TRAINING HE HAS CONDUCTED AND ALLOW ME TO PERSONALLY CHECK THE ADEQUACY.

THESE ARE JUST THE MAIN ELEMENTS OF THE TRAINING EFFORTS IN MY PROGRAM. BECAUSE TRAINING IS SO IMPORTANT, I WANT TO PROVIDE A MUCH MORE DETAILED DESCRIPTION OF WHAT WE DO FOR YOUR RECORD. I KNOW YOU DO NOT HAVE TIME FOR ME TO READ THIS DESCRIPTION NOW, BUT I STRONGLY RECOMMEND THAT ALL THE COMMITTEE MEMBERS READ IT BECAUSE IT MAY BE OF VALUE IN YOUR REVIEW.

MISTAKES MUST BE TAKEN INTO ACCOUNT

WHAT I HAVE PRESENTED AT THIS POINT REPRESENTS THE MAIN SUBSTANCE OF MY STATEMENT. IN IT I HAVE OUTLINED WHAT I DO IN RUNNING THE NAVAL REACTORS PROGRAM. EVEN WHEN THESE MEASURES ARE CARRIED OUT IT IS IMPORTANT TO RECOGNIZE THAT MISTAKES WILL BE MADE, BECAUSE WE ARE DEALING WITH MACHINES AND THEY CANNOT BE MADE PERFECT. THE HUMAN BODY IS GOD'S FINEST CREATION AND YET WE GET SICK. IF WE CANNOT HAVE PERFECT HUMAN BEINGS THEN WHY SHOULD WE EXPECT, PHILOSOPHICALLY, THAT MACHINES DESIGNED BY HUMAN BEINGS WILL BE MORE PERFECT THAN THEIR CREATORS? THAT IS WHAT MANY UNTHINKING PEOPLE DEMAND EVEN THOUGH THE LORD HIMSELF DID NOT REACH THIS HEIGHT. I BELIEVE IF YOU FOLLOW THE PRACTICES OF CONSERVATIVE

ENGINEERING AND PERSONNEL TRAINING I HAVE OUTLINED AND IF YOU CARRY THEM OUT WITH STEADFAST COMMITMENT, NUCLEAR POWER CAN BE SAFELY USED, EVEN TAKING INTO ACCOUNT MISTAKES THAT WILL INEVITABLY OCCUR. THAT IS THE BASIS ON WHICH I HAVE CONDUCTED ALL MY WORK IN THIS FIELD AND I BELIEVE IT TRUE JUST AS STRONGLY TODAY AS I EVER HAVE.

DECISION ON NUCLEAR POWER

AS WELL AS ANYONE IN THIS ROOM, I RECOGNIZE THAT NUCLEAR POWER IS A VERY DIFFICULT SUBJECT FOR ANYONE TO DEAL WITH. IT INVOLVES ENERGY - A VITAL ELEMENT IN OUR NATION'S FUTURE. IT INVOLVES INDIVIDUALS' CONCERNS FOR THEMSELVES AND THEIR FAMILIES, AND IT IS A HIGHLY TECHNICAL, SOPHISTICATED TECHNOLOGY. ULTIMATELY, THE DECISION AS TO WHETHER WE WILL HAVE NUCLEAR POWER IS A POLITICAL ONE - IN THE TRUE SENSE OF THE WORD - THAT IS, ONE MADE BY THE PEOPLE THROUGH THEIR ELECTED REPRESENTATIVES. IT IS VITAL THAT THE DECISION BE MADE ON THE BASIS OF FACT, NOT RHETORIC, NOT CONJECTURE OR HOPE, OR AS A RESULT OF THE WIDESPREAD TENDENCY TO SENSATIONALIZE THE CURRENT TOPIC AND IGNORE THE REAL LIMITS OR RISKS OF THE ALTERNATIVE.

I AM NOT AN EXPERT OR EVEN PARTICULARLY KNOWLEDGEABLE IN THE AREAS OF ENVIRONMENTAL EFFECTS OF OTHER FORMS OF

POWER GENERATION. HOWEVER, I AM AWARE THAT A GOOD MANY KNOWLEDGEABLE PEOPLE CONCLUDE THAT THE TOTAL RISK INVOLVED IN THE USE OF NUCLEAR POWER IS NO GREATER THAN IS INVOLVED IN THE USE OF ANY ALTERNATE SOURCE WHICH CAN BE TAPPED IN THE NEXT 50 YEARS.

I ALSO REMEMBER THE OPTIMISTIC PROJECTIONS MADE FOR NUCLEAR POWER WHEN IT WAS FIRST BEING DEVELOPED. THESE SPRANG FROM HOPE AND FROM IGNORANCE OF THE REAL ENGINEERING PROBLEMS THAT WOULD BE ENCOUNTERED IN USING NUCLEAR POWER. THERE IS NO REASON TO BELIEVE THAT CURRENT PROJECTIONS FOR ALTERNATE MEANS OF PROVIDING LARGE AMOUNTS OF POWER ARE ANY MORE PRECISE. ANY LARGE SCALE GENERATION OF POWER INVOLVES MAJOR ENGINEERING DIFFICULTIES AND POTENTIAL ENVIRONMENTAL IMPACTS.

THE JOB OF THIS COMMITTEE AND THE CONGRESS IN THE DAYS AHEAD WILL NOT BE EASY. I HOPE AND PRAY YOU WILL FIND THE STRENGTH AND WISDOM TO MAKE THE RIGHT DECISIONS. I ALSO HOPE THAT MY TESTIMONY WILL IN SOME WAY CONTRIBUTE TO YOUR DIFFICULT DELIBERATIONS.

NAVAL NUCLEAR PROPULSION OPERATOR TRAINING PROGRAM

I WILL NOW DISCUSS IN GREATER DEPTH THE PERSONNEL ASPECTS OF THE NAVAL NUCLEAR PROPULSION PROGRAM. I WILL DESCRIBE WHAT IS INVOLVED IN THE SELECTION, TRAINING, QUALIFICATION, AND REQUALIFICATION OF THE OPERATORS; AND I WILL DESCRIBE THE METHODS AND PROCEDURES USED TO ENSURE THAT POLICIES AND DIRECTIVES OF THE NUCLEAR PROGRAM ARE CARRIED OUT. AS I HAVE PREVIOUSLY STATED, ALL OF THESE ELEMENTS MUST MESH FOR THE SYSTEM TO WORK. YOU CANNOT SEPARATE OUT AND USE THE PIECES WHICH YOU LIKE, AND DISCARD THOSE WHICH ARE "TOO HARD".

BY THE SAME TOKEN, IT IS IMPOSSIBLE TO SEPARATE TRAINING FROM THE TECHNICAL SIDE OF THE NUCLEAR PROGRAM. WITHIN THE NAVAL REACTORS HEADQUARTERS ORGANIZATION, ALL OF THE ENGINEERS ARE VERY MUCH AWARE OF THE IMPACT OF ENGINEERING DECISIONS ON THE OPERATING PERSONNEL AND OF THE REQUIREMENTS FOR TRAINING ON NEW EQUIPMENT OR PROCEDURES. THIS IS ALSO TRUE FOR THE ENGINEERS WHO WORK AT OUR TWO LABORATORIES. ALSO, MANY OF THE MORE EXPERIENCED ENGINEERS IN NAVAL REACTORS HEADQUARTERS ASSIST IN CERTAIN PHASES OF THE PERSONNEL SELECTION PROCESS FOR OPERATORS AND ARE DIRECTLY INVOLVED IN THE TRAINING CONDUCTED AT NAVAL REACTORS.

You should also note the longevity of experience at Naval Reactors, not just as it relates to me but as it is manifested in the large majority of people in my headquarters organization. Approximately one-fourth of my headquarters engineers have been in the naval reactors program for more than twenty years. This experience and stability is important not just in training but in all aspects of the program.

When the nuclear propulsion program started, more than thirty years ago, I realized it was necessary to have excellence in operating personnel. In view of the possible serious consequences of a reactor accident I considered it of utmost importance that the operation of nuclear powered ships be entrusted only to those whose mental abilities, qualities of judgment and degreee of training were commensurate with the public responsibility involved. The personnel selection and training procedures for the Naval Nuclear Propulsion Program were developed with these considerations in mind. They have evolved with experience over the last twenty-five years and are still changing. I do not say that use of these methods is the only way, but this is the way it has been found to work in the naval program, and I do not know of a better way to do it. If I did, I would use it.

Earlier in my statement I discussed the general principles I have used to form the basis of the naval nuclear propulsion

PROGRAM. I WILL STATE THOSE WHICH RELATE TO PERSONNEL AND TRAINING, AND THEN ATTEMPT TO SHOW HOW THESE ARE ACHIEVED.

(1) CAREFUL SELECTION OF PERSONNEL.

(2) EXTENSIVE INITIAL TRAINING FOR PERSONNEL (PRIOR TO SHIPBOARD ASSIGNMENT), INCLUDING THE USE OF ACTUAL OPERATING PROTOTYPE PLANTS.

(3) A THOROUGH QUALIFICATION AND REQUALIFICATION PROGRAM FOR ALL PERSONNEL.

(4) CONSTANT REINFORCEMENT OF PRINCIPLES AND PROCEDURES BY A FORMAL CONTINUING TRAINING PROGRAM FOR ALL OPERATORS. THIS PROGRAM STRIVES TO CONTINUALLY UPGRADE THE KNOWLEDGE AND UNDERSTANDING OF OPERATORS AT ALL QUALIFICATION LEVELS.

(5) FREQUENT PRACTICE OF CASUALTY DRILLS AND PLANT EVOLUTIONS IN ALL OPERATING SHIPS AND PROTOTYPES.

(6) CONTINUING REVIEW OF PERSONNEL PERFORMANCE AND REMOVAL FROM THE PROGRAM OF THOSE WHO DO NOT MEET STANDARDS.

(7) FREQUENT INSPECTIONS OF PLANTS AND PLANT OPERATIONS BY PERSONNEL ASSIGNED TO THE PLANT AND BY HIGHER AUTHORITY WITH SYSTEMATIC FOLLOW UP ON DEFICIENCIES.

(8) A FEEDBACK SYSTEM IN WHICH DESIGN, MATERIAL, PERSONNEL AND PROCEDURAL PROBLEMS ARE BROUGHT PROMPTLY TO MY PERSONAL ATTENTION TOGETHER WITH THE CORRECTIVE ACTION REQUIRED IN EACH CASE.

(9) A COMMON BASE OF HIGH STANDARDS OF PERSONNEL PERFORMANCE IN ALL AREAS INCLUDING STRICT COMPLIANCE WITH DETAILED OPERATING AND CASUALTY PROCEDURES.

SELECTION OF PERSONNEL

THE RESPONSIBILITIES INVOLVED IN OPERATING NAVAL NUCLEAR POWERED SHIPS AND THE REQUIREMENTS OF THE NUCLEAR PLANTS THEMSELVES MAKE IT ESSENTIAL THAT INDIVIDUALS IN THE PROGRAM HAVE A HIGH DEGREE OF INTELLIGENCE AND CAPACITY TO LEARN. EARLY IN THE PROGRAM I RECOGNIZED THAT NORMAL PROCEDURES OF PERSONNEL SELECTION AND ASSIGNMENT USED BY THE NAVY COULD NOT BE COUNTED ON TO PROVIDE THIS PROGRAM WITH THE PROPER TYPE OF INDIVIDUAL. IN ORDER TO SELECT CANDIDATES OF THE NECESSARY INTELLECTUAL CAPACITY AND MOTIVATION, A NUMBER OF SPECIAL MEASURES HAD TO BE TAKEN. HOWEVER, I COULD NOT JUST FOLLOW TYPICAL CIVILIAN PROCEDURES. RECOGNITION HAD TO BE GIVEN TO THE FACT THAT I WAS DEALING WITH A BODY OF MILITARY PEOPLE. THIS MEANT WE WOULD BE FACED WITH THE INEVITABLE HIGH TURNOVER RATE, THE PROBLEMS TYPICAL OF YOUNG, INEXPERIENCED ENLISTED MEN, AND THE ANTIQUATED NAVY TRAINING METHODS.

REQUIREMENTS FOR OFFICERS

OFFICERS FOR ASSIGNMENT TO THE ENGINEERING CREWS OF THE FIRST NUCLEAR-POWERED SHIPS WERE, BY NECESSITY, DRAWN FROM

THOSE HAVING HAD PREVIOUS SHIPBOARD EXPERIENCE. WHILE I KNEW THIS WAS NOT THE BEST WAY, I HAD NO CHOICE. AS THE NUMBER OF NUCLEAR-POWERED SHIPS GREW, THE SOURCE OF SEA-EXPERIENCED OFFICERS BECAME INSUFFICIENT TO SUPPORT THE NEEDS. THEREFORE, BEGINNING IN 1960, A NUMBER OF TOP RANKING STUDENTS GRADUATING FROM THE NAVAL ACADEMY, NROTC COLLEGES, AND FROM THE NAVY'S OFFICER CANDIDATE SCHOOL WERE SELECTED TO ENTER NUCLEAR POWER TRAINING FOLLOWING GRADUATION. IN 1969 THE NUCLEAR POWER OFFICER CANDIDATE (NUPOC) PROGRAM WAS ADDED THROUGH WHICH TOP GRADUATES OF ALL COLLEGES ARE GIVEN THE OPPORTUNITY TO APPLY FOR NUCLEAR POWER TRAINING. TODAY, THESE PROGRAMS WHICH TAKE OFFICERS DIRECTLY FROM THE NAVAL ACADEMY OR CIVILIAN COLLEGES ACCOUNT FOR MORE THAN 95% OF THE OFFICERS ENTERING THE NUCLEAR TRAINING PROGRAM. TO DATE, SOME 7,000 OFFICERS HAVE BEEN TRAINED IN THE NUCLEAR POWER PROGRAM.

OFFICERS WHO APPLY FOR NUCLEAR TRAINING MUST BE COLLEGE GRADUATES MEETING MINIMUM REQUIREMENTS FOR COURSES IN MATHEMATICS AND SCIENCE. THE COLLEGE RECORDS ARE SCREENED TO DETERMINE SCHOLASTIC APTITUDE, AND PERFORMANCE. FOR THOSE OFFICERS WITH SEA EXPERIENCE, NAVAL RECORDS ARE ALSO REVIEWED TO DETERMINE EFFECTIVENESS AS NAVAL OFFICERS, EXPERIENCE LEVEL (PARTICULARLY IN ENGINEERING), AND THEIR COMMANDING OFFICER'S EVALUATION OF THEM AS CANDIDATES FOR THE NUCLEAR PROGRAM. THIS SCREENING IS PERFORMED BY THE BUREAU OF NAVAL

PERSONNEL WITH THE ADVICE AND ASSISTANCE OF NAVAL REACTORS PERSONNEL.

IN ORDER TO FURTHER ENSURE THAT ONLY OFFICERS WITH THE NECESSARY POTENTIAL AND MOTIVATION ARE SELECTED FOR THE NAVAL NUCLEAR PROPULSION PROGRAM, THE CANDIDATES ARE EACH CALLED TO WASHINGTON AND INTERVIEWED BY SEVERAL SENIOR MEMBERS OF MY STAFF AND FINALLY BY ME. IN ADDITION TO PROVIDING INFORMATION OVER AND ABOVE THAT AVAILABLE IN AN OFFICER'S SERVICE RECORD ON HIS INTELLIGENCE AND ABILITY, THESE INTERVIEWS ARE USEFUL IN DETERMINING THE WILLINGNESS OF THE OFFICER TO UNDERTAKE THE DIFFICULT TRAINING PROGRAM FOR NUCLEAR PROPULSION ASSIGNMENT AND HIS INTEREST IN PROFESSIONAL ADVANCEMENT AS EVIDENCED BY HIS WORK AND STUDY HABITS.

THIS PROCESS OF INTERVIEWING HAS BEEN CRITICIZED FOR YEARS BY MANY SENIOR NAVAL OFFICERS. I AM CONTINUALLY ASKED TO ABOLISH THIS PROCEDURE WITH THE SUGGESTION THAT ALL I NEED TO DO IS SET DOWN SOME STANDARDS ON ACADEMIC REQUIREMENTS AND ALL THOSE WHO MEET THEM CAN BE ORDERED INTO TRAINING. IF THEY PASS THE RIGOROUS TRAINING PROGRAM THEN THEY ARE ACCEPTABLE. THERE ARE A NUMBER OF REASONS WHY I DO NOT AGREE WITH THIS SUGGESTION. FIRST OF ALL, THE INTERVIEWS ARE ABLE TO DETECT AN INDIVIDUAL WHO MAY HAVE GOOD SCHOOL GRADES BUT WHO IS REALLY INCAPABLE OF PASSING THE COURSE.

THIS HAS BEEN PARTICULARLY TRUE OVER THE PAST FIFTEEN YEARS WHEN COLLEGE GRADES HAVE GENERALLY LOST MEANING. IT IS A WASTE OF MONEY AND EFFORT TO ALLOW A PERSON TO ENTER TRAINING WHO THEN FAILS, PARTICULARLY IF YOU CAN PREDICT THE FAILURE AHEAD OF TIME. THE OTHER REASON I INSIST ON THE INTERVIEWS IS MORE BASIC. SOME CANDIDATES MAY HAVE PERFECTLY FINE GRADES AND COULD UNDOUBTEDLY PASS THE ACADEMIC PORTION OF THE COURSE. HOWEVER, THEY MAY HAVE ABSOLUTELY NO CAPABILITY TO BE PUT IN CHARGE OF THE OPERATION OF A REACTOR PLANT. IF I CAN NOT BE CONVINCED IN MY OWN MIND THAT THAT OFFICER CAN BE TAUGHT TO CARRY OUT HIS DUTIES RESPONSIBLY WITH REGARD TO THE SAFE OPERATION OF THE REACTOR PLANT AT SEA UNDER TRYING CONDITIONS, THEN I CANNOT AND WILL NOT ACCEPT HIM. TO ME THIS IS A VERY IMPORTANT PART OF THE PROGRAM.

REQUIREMENTS FOR ENLISTED PERSONNEL

AS IN THE CASE OF OFFICERS, IN THE EARLY YEARS OF THE NUCLEAR PROGRAM ENLISTED CANDIDATES CAME FROM THE FLEET AND HAD SHIPBOARD ENGINEERING EXPERIENCE. THOSE WHO APPLIED WERE INTERVIEWED AND SCREENED BY THEIR COMMANDING OFFICERS BEFORE BEING RECOMMENDED AS CANDIDATES. ELIGIBILITY CRITERIA WERE ESTABLISHED BY THE CHIEF OF NAVAL PERSONNEL WITH THE ADVICE AND ASSISTANCE OF NAVAL REACTORS. ASSIGNMENT TO THE NUCLEAR PROGRAM WAS MADE BY THE BUREAU OF NAVAL PERSONNEL

FROM AMONG THOSE RECOMMENDED.

THE MANNING REQUIREMENTS FOR THE EXPANDING NUCLEAR SUBMARINE PROGRAM AND THE NUCLEAR SURFACE SHIP PROGRAM REQUIRED A NEW SOURCE OF PEOPLE FOR TRAINING. IN 1957 DIRECT INPUT OF ENLISTED MEN FOR NUCLEAR PROPULSION TRAINING WAS PROVIDED BY A PROGRAM OF RECRUITING PROMISING YOUNG HIGH SCHOOL GRADUATES INTO THE NAVY, SPECIFICALLY FOR ULTIMATE DUTY IN NUCLEAR SHIP ENGINEERING DEPARTMENTS. TODAY THIS PROGRAM IS THE PRIMARY SOURCE OF ENLISTED PERSONNEL FOR NUCLEAR POWER TRAINING. APPROXIMATELY 40,000 ENLISTED OPERATORS HAVE COMPLETED THE NAVAL NUCLEAR PROPULSION TRAINING PROGRAM TO DATE.

THE SUPERVISION, OPERATION, AND MAINTENANCE OF NAVAL NUCLEAR PROPULSION PLANTS REQUIRE A HIGH LEVEL OF COMPETENCE, RELIABILITY, AND EXPERTISE. FOR THESE REASONS HIGH SELECTION CRITERIA WERE ESTABLISHED EARLY IN THE PROGRAM. LATER, AS THE NUMBER OF PERSONNEL IN THE PROGRAM INCREASED, WE EXPERIENCED HIGHER ATTRITION IN THE TRAINING CYCLE. TO REDUCE THIS ATTRITION, THE EDUCATIONAL SELECTION CRITERIA WERE MADE MORE RESTRICTIVE.

TODAY, ALL ENLISTED APPLICANTS FOR NUCLEAR TRAINING MUST BE HIGH SCHOOL GRADUATES WHO HAVE COMPLETED ONE YEAR OF ALGEBRA IN HIGH SCHOOL OR COLLEGE, AND HAVE ACHIEVED AT

LEAST A "C" OR EQUIVALENT GRADE IN THAT COURSE. ADDITIONALLY, ALL CANDIDATES MUST DEMONSTRATE HIGH ACADEMIC ABILITY IN THE AREAS OF MATH AND SCIENCE AS MEASURED BY THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY TESTS AND THE NUCLEAR FIELD QUALIFICATION TEST. THESE ARE ADMINISTERED BY THE NAVY RECRUITING COMMAND PRIOR TO AN APPLICANT'S SELECTION FOR NUCLEAR TRAINING. THESE TESTS GIVE AN INDICATION OF THE APPLICANT'S ABILITY TO HANDLE THE STUDY OF MATHEMATICS AND PHYSICS; SUBJECTS WHICH FORM THE BASIS OF THE NUCLEAR POWER TRAINING CURRICULUM.

SELECTION OF NUCLEAR PERSONNEL, OFFICER OR ENLISTED, MUST NECESSARILY REQUIRE AN IN-DEPTH REVIEW OF A CANDIDATE'S CHARACTER IN ADDITION TO HIS ACADEMIC CAPABILITY. FOR THIS REASON, ANY PERSON WHO HAS BEEN CONVICTED OF, OR WHO IS IDENTIFIED AS HAVING COMMITTED, A SERIOUS OFFENSE WILL NOT BE ACCEPTED. A SINGLE MINOR OFFENSE INVOLVING MORAL TURPITUDE OR WHICH EVIDENCES UNRELIABILITY MAY BE CONSIDERED DISQUALIFYING. FREQUENT TRAFFIC VIOLATIONS OR ACCIDENTS THAT INDICATE UNRELIABILITY, RECKLESSNESS OF CHARACTER, OR BASIC DISREGARD FOR AUTHORITY MAY ALSO BE CAUSE FOR DENYING ENTRY INTO THE NUCLEAR PROGRAM.

ANY INDIVIDUAL WHO HAS BEEN CONVICTED OF, OR IS IDENTIFIED AS, HAVING ILLEGALLY, WRONGFULLY, OR OTHERWISE IMPROPERLY

USED, POSSESSED OR SOLD MARIJUANA OR OTHER DRUGS WILL BE DENIED ENTRY INTO OR CONTINUATION IN THE NUCLEAR PROGRAM. ANYONE SHOWING SIGNS OF BEING OR BECOMING ADDICTED TO ALCOHOL IS ALSO EXCLUDED FROM ENTRY INTO THE PROGRAM. WAIVERS FOR ENTRY INTO THE NUCLEAR POWER PROGRAM MAY BE GRANTED IN THE CASE OF PRE-SERVICE USE OF MARIJUANA WHERE IT CAN BE ESTABLISHED THAT THE USAGE WAS OF AN INFREQUENT EXPERIMENTAL NATURE AND FURTHER USE HAS BEEN STOPPED. A WAIVER OF THIS TYPE MAY ONLY BE GRANTED BY THE COMMANDER, NAVY RECRUITING COMMAND WITH THE CONCURRENCE OF THE CHIEF OF NAVAL PERSONNEL. PERSONNEL ON MY STAFF AT NAVAL REACTORS REVIEW AND CONCUR IN EACH CASE IN WHICH A WAIVER IS GRANTED.

IT SHOULD BE NOTED HERE THAT THESE WAIVERS MAY BE GRANTED ONLY FOR PRE-SERVICE USE OF MARIJUANA. THE ILLEGAL USE OF ANY DRUG, INCLUDING MARIJUANA, AFTER ENTRY INTO THE SERVICE IS NOT TOLERATED. THIS COMES TO LIGHT FROM TIME TO TIME AND ALL INDIVIDUALS INVOLVED ARE IMMEDIATELY REMOVED FROM FURTHER DUTY INVOLVING NUCLEAR POWER. NO MATTER HOW EXEMPLARY THEIR SUBSEQUENT PERFORMANCE MAY BE, THEY ARE NOT ALLOWED TO RETURN AS NUCLEAR PROPULSION PLANT OPERATORS.

NUCLEAR TRAINED PERSONNEL ARE SUBJECT TO A CONTINUING RELIABILITY SCREENING PROCESS FROM THE MOMENT THEY ARE APPROVED FOR ENTRY INTO THE PROGRAM. ALL DISCIPLINARY INFRACTIONS, WHETHER CIVILIAN OR MILITARY IN NATURE, ARE REVIEWED TO DETERMINE AN INDIVIDUAL'S ELIGIBILITY FOR

CONTINUATION IN THE NUCLEAR POWER PROGRAM. REVIEWS OF RECORDS ARE CONDUCTED IN ORDER TO IDENTIFY DISQUALIFYING PROFESSIONAL PERFORMANCE, AS WELL AS DISQUALIFYING MEDICAL OR PSYCHOLOGICAL FACTORS.

PRE-NUCLEAR PROGRAM TRAINING

INITIAL NAVAL TRAINING OF ENLISTED PERSONNEL SELECTED FOR NUCLEAR TRAINING IS CONDUCTED AT SEVERAL TRAINING SITES THROUGHOUT THE COUNTRY. DURING BASIC RECRUIT TRAINING, THE CANDIDATE IS SCREENED AND CLASSIFIED INTO ONE OF THE PROGRAM RATINGS (MACHINIST'S MATE, ELECTRICIAN'S MATE, INTERIOR COMMUNICATIONS, OR ELECTRONICS TECHNICIAN) ACCORDING TO HIS CAPABILITIES AND THE NEEDS OF THE PROGRAM. THE TRAINEE THEN ATTENDS APPROPRIATE NAVY CLASS "A" SCHOOL TRAINING, WHICH VARIES IN LENGTH FROM TWO TO FIVE MONTHS. THE CURRICULA ARE BASIC TO THE RATINGS AND ARE NOT SPECIALIZED FOR NUCLEAR POWER. THESE CLASS "A" SCHOOLS ARE OPERATED BY THE CHIEF OF NAVAL EDUCATION AND TRAINING, AND ARE NOT CONTROLLED BY NAVAL REACTORS. NUCLEAR PROGRAM TRAINEES COMPLETING CLASS "A" SCHOOL TRAINING WILL NORMALLY BE ORDERED DIRECTLY TO NUCLEAR POWER SCHOOL AT ORLANDO, FLORIDA.

IT SHOULD BE NOTED HERE, THAT UNTIL A NUCLEAR PROGRAM ENLISTEE COMMENCES SPECIALIZED NUCLEAR POWER TRAINING AT

ORLANDO, HE HAS ATTENDED GENERAL NAVY SCHOOLS AND TRAINED IN HIS RATING ALONGSIDE HIS CONVENTIONAL ENGINEERING COUNTERPART. IF HE IS UNABLE TO SATISFY THE DEMANDING ACADEMIC REQUIREMENTS IN THE NUCLEAR SCHOOLS, THEN HE IS IMMEDIATELY AVAILABLE TO BE ASSIGNED TO A CONVENTIONAL ENGINEERING BILLET OF HIS RATING. THOSE MEN WHO LEAVE THE NUCLEAR PROGRAM FOR ACADEMIC FAILURE ARE THEREFORE ABLE TO CONTINUE THEIR NAVAL SERVICE AND MAKE A VALUABLE CONTRIBUTION TO THE AT-SEA MANNING OF THE CONVENTIONAL NAVY IN TECHNICAL FIELDS. IN ADDITION, NEARLY ALL OF THE NAVY'S REQUIREMENTS FOR NUCLEAR TRAINED PERSONNEL ARE FOR SEA DUTY. THEREFORE, IT IS IMPORTANT THAT NUCLEAR TRAINED PERSONNEL ARE ABLE TO FILL GENERAL NAVY RATING BILLETS BECAUSE THE FEW NUCLEAR SHORE BILLETS WOULD NOT PROVIDE REASONABLE SEA-SHORE ROTAION. THIS WOULD ADVERSELY AFFECT THE RETENTION OF OUR NUCLEAR TRAINED PERSONNEL.

OBJECTIVES AND PHASES OF NAVAL NUCLEAR PROPULSION TRAINING

THE OBJECTIVE OF THE NAVAL NUCLEAR PROPULSION TRAINING PROGRAM IS TO PREPARE OFFICERS AND ENLISTED ENGINEERING PERSONNEL TO DISCHARGE THEIR RESPONSIBILITY FOR SAFE AND EFFECTIVE OPERATION OF PROPULSION PLANTS OF NUCLEAR-POWERED SHIPS. THIS IS ACCOMPLISHED BY TEACHING THEM: (1) THE PRINCIPLES OF SCIENCE AND ENGINEERING WHICH ARE FUNDAMENTAL TO THE DESIGN, CONSTRUCTION, AND OPERATION OF NAVAL NUCLEAR PROPULSION PLANTS; AND (2) THE DETAILS AND PRACTICAL KNOWLEDGE

REQUIRED TO OPERATE AND MAINTAIN THESE PLANTS.

THE PROGRAMS TO TRAIN PERSONNEL FOR ENGINEERING DUTY ABOARD NAVAL NUCLEAR-POWERED SHIPS ARE CENTERED AROUND FOUR MAJOR PHASES - FORMAL ACADEMIC INSTRUCTION, OPERATIONAL TRAINING AT ONE OF THE DEPARTMENT OF ENERGY LAND-BASED NAVAL REACTOR PROTOTYPES, TRAINING AND QUALIFICATION AS A WATCHSTANDER ABOARD AN OPERATING NAVAL NUCLEAR-POWERED SHIP, AND CONTINUING SHIPBOARD TRAINING. EACH OF THESE FOUR PHASES IS ESSENTIAL IN THE SATISFACTORY TRAINING OF AN OPERATOR AND PROVIDING ASSURANCE THAT ONLY THOSE WHO ARE MENTALLY AND EMOTIONALLY CAPABLE,AND WHO HAVE DEMONSTRATED ABILITY AS A COMPETENT NUCLEAR PROPULSION PLANT OPERATOR ARE ASSIGNED DUTY ABOARD NUCLEAR-POWERED SHIPS.

FORMAL ACADEMIC INSTRUCTION

THE NUCLEAR PROPULSION TRAINING PROGRAM BEGAN IN 1951 WITH THE ENGINEERING OFFICERS AND CREW OF THE NAUTILUS. THE INITIAL THEORETICAL TRAINING WAS GIVEN AT THE ATOMIC ENERGY COMMISSION'S NAVAL REACTORS LABORATORY IN PITTSBURGH, PENNSYLVANIA. WHEN CONSTRUCTION OF THE NAUTILUS PROTOTYPE IN IDAHO WAS SUFFICIENTLY ADVANCED, THE TRAINEES WERE TRANSFERRED TO THE PROTOTYPE WHERE THEY CONTINUED BOTH THEORETICAL AND OPERATIONAL TRAINING. UPON REPORTING TO THE NAUTILUS AT THE BUILDING YARD, DETAILED SHIPBOARD TRAINING WAS CONDUCTED THROUGHOUT THE CONSTRUCTION, TEST, AND TRIAL PERIOD, UNDER supervision of Naval Reactors and contractor personnel. A similar program was commenced in 1953 for the SEAWOLF engineering officers and men at the Atomic Energy Commission Naval Reactors Laboratory and prototype site in West Milton, New York. As the number of nuclear-powered ships authorized for construction increased, it was recognized that a program capable of training large numbers of officers and enlisted men should be established. The Naval Nuclear Power School was established at New London, Connecticut in January, 1956 and graduated its first class of nuclear submarine officers in June, 1956. This school was subsequently relocated at Bainbridge, Maryland.

Academic training for surface ship officers was continued at the Idaho prototype site until 1959 when a second Naval Nuclear Power School was established at Mare Island, California, for both surface and submarine personnel. From 1959 until 1976 all formal academic training for officers and enlisted personnel in the Naval Nuclear Program was carried out at one of these two Naval Nuclear Power Schools. In 1976, the school at Bainbridge, Maryland was moved to Orlando, Florida and in 1977 the school at Mare Island, California merged with the Nuclear Power School, Orlando, where all formal academic training is presently conducted.

PURPOSE OF NUCLEAR POWER SCHOOL

The purpose of Naval Nuclear Power School, Orlando is to teach officer and enlisted students those principles of science and engineering fundamentals necessary for the understanding of the operation of naval nuclear propulsion plants, and to prepare them for future assignment to prototype training and eventual responsibilities relating to the safe and effective operation of propulsion plants of nuclear powered ships.

In pursuit of this purpose we set high standards and we stick to them. We stress that the operator must be trained in basic principles, so that he knows not only what he is doing, but why. We teach basic theory, principles of the basic components and systems, and application of these systems and theory to watchstation duties. The students are tested with frequent and demanding examinations to be sure their knowledge can be applied, not just their memory exercised. We motivate them to perform, and do not allow them to proceed at their own pace, if it is too slow. Classroom instruction takes priority over everything else at Nuclear Power School.

NUCLEAR POWER SCHOOL ORGANIZATION

Nuclear Power School is comprised of four departments under a Commanding Officer and Executive Officer. A Pre-School Department, Enlisted Department, Officer Department, and

Administrative Department make up this organization.

The Commanding Officer is responsible for the academic program. He certifies that instructors are technically prepared to teach, approves the examinations, monitors the performance of the instructors and recommends student disenrollments.

Department Heads are responsible for the course content specified in approved topical guides. They are responsible for instructor training, review of proposed examinations, and monitoring the performance of instructors in their respective departments.

The Commanding Officer of Nuclear Power School has already served as Commanding Officer of a nuclear powered ship. The Executive Officer is nuclear trained and has served as the Executive Officer of a ship. The academic department heads have all served as Engineer Officers of nuclear powered ships.

The instructors at Nuclear Power School come from two sources:

(1) Direct input officers recruited specifically to serve as instructors. They are selected by Naval Reactors in the same manner as officer students but must meet higher academic criteria in their educational field. After a six week Navy indoctrination course at Newport, Rhode Island, they report to Nuclear Power School to teach for their four year tour of duty in the Navy. Many of these officers have advanced degrees

IN THEIR ACADEMIC SPECIALTY.

(2) OFFICER AND ENLISTED INSTRUCTORS WHO HAVE ALREADY COMPLETED A TOUR OF SEA DUTY ON A NUCLEAR POWERED SHIP. TYPICALLY THESE SEA RETURNEE INSTRUCTORS HAVE GRADUATED IN THE TOP FIFTY PERCENT OF THEIR NUCLEAR POWER SCHOOL AND PROTOTYPE CLASSES. THEY ALSO HAVE AN EXCELLENT FLEET PERFORMANCE RECORD. OFFICER INSTRUCTORS SO ASSIGNED HAVE ALREADY QUALIFIED TO SERVE AS ENGINEER OFFICER OF A NUCLEAR POWERED SHIP.

PRE-SCHOOL DEPARTMENT

THE PURPOSE OF PRE-NUCLEAR POWER SCHOOL IS TO BRING ALL ENLISTED STUDENTS TO A COMMON ACCEPTABLE LEVEL IN MATHEMATICS AND PHYSICS; TO PREPARE STUDENTS MEDICALLY AND ADMINISTRATIVELY FOR ENROLLMENT; AND TO TEACH STUDENTS HOW TO STUDY. THE LENGTH OF PRE-SCHOOL IS EITHER SIX OR THREE WEEKS DEPENDING UPON THE INDICATED ACADEMIC ABILITY OF THE STUDENT BASED ON THE NUCLEAR FIELD QUALIFICATION TEST SCORE AND PREVIOUS NAVY SCHOOL PERFORMANCE. THE PRE-SCHOOL CURRICULUM IS NOT PART OF THE NUCLEAR POWER SCHOOL CURRICULUM FOR TRAINING THE INDIVIDUAL TO BE A NUCLEAR PROPULSION PLANT OPERATOR. PRE-SCHOOL GIVES STUDENTS WITH WEAK HIGH SCHOOL ACADEMIC BACKGROUNDS A BETTER OPPORTUNITY TO PASS THE RIGOROUS NUCLEAR POWER SCHOOL COURSE; IT ALSO FACILITATES ASSIGNMENT OF PERSONNEL SO THAT LESS TIME IS WASTED BETWEEN COMPLETION OF NAVY RATING SCHOOL AND COMMENCEMENT OF NUCLEAR POWER SCHOOL.

ENLISTED DEPARTMENT

THE ENLISTED DEPARTMENT IS MADE UP OF SEVEN ACADEMIC DIVISIONS EACH HEADED BY A DIVISION DIRECTOR. THE DIVISION DIRECTOR IS RESPONSIBLE FOR THE SUBJECT CONTENT OF THE COURSE IN ACCORDANCE WITH APPROVED TOPICAL GUIDES; FOR TRAINING HIS INSTRUCTORS; AND FOR PREPARING ALL OF HIS EXAMINATIONS. THE ACADEMIC DIVISIONS CONCENTRATE ON THE QUALITY OF THEIR TEACHING, THE QUALITY OF THEIR GROUP EXTRA INSTRUCTION AND INDIVIDUAL TUTORING WHICH IS GIVEN TO THE WEAKER STUDENTS.

THE ENLISTED DEPARTMENT IS ALSO ORGANIZED MILITARILY TO PROVIDE ADVISORS WHO COUNSEL THE STUDENTS.

OFFICER DEPARTMENT

THE OFFICER DEPARTMENT IS ORGANIZED IN A SIMILAR MANNER TO THE ENLISTED DEPARTMENT, WITH THE EXCEPTION THAT THE INSTRUCTORS ALSO FILL A MILITARY ROLE AS ADVISORS AND COUNSELORS.

CIVILIAN SUPPORT, BETTIS TECHNICAL CONSULTANTS

Two experienced civilian scientists from the Bettis Atomic Power Laboratory are in residence at Nuclear Power School as Technical Consultants.

The role of the Bettis Technical Consultants is to act as a technical advisor to Nuclear Power School staff, maintain liaison between Nuclear Power School and the Bettis Atomic Power Laboratory, and monitor Nuclear Power School effectiveness. They also assist the instructors in preparing and presenting the course material.

NUCLEAR POWER SCHOOL CURRICULUM

The Nuclear Power School curriculum is prepared under my direction by the Naval Reactors staff in Washington. The assistance of the Naval Reactors laboratories is utilized in developing the curriculum. The course at Nuclear Power School lasts six months and consists of approximately 700 hours of classroom instruction.

The officer student curriculum includes mathematics, physics, heat transfer and fluid flow, electrical engineering, reactor dynamics, chemistry, aspects of reactor plant operations, materials, radiological fundamentals, core characteristics and reactor plant systems, which is an overview of all mechanical and

ELECTRICAL SYSTEMS. OFFICERS RECEIVE INSTRUCTION UP TO AND INCLUDING THE GRADUATE LEVEL.

THE ENLISTED CURRICULUM INCLUDES REACTOR PLANT SYSTEMS, MATHEMATICS, PHYSICS, HEAT TRANSFER AND FLUID FLOW, REACTOR PRINCIPLES, CHEMISTRY, RADIOLOGICAL FUNDAMENTALS, MATERIALS, SPECIALIZED IN-RATE INSTRUCTION ON PLANT SYSTEMS AND REACTOR PLANT OPERATIONS. ENLISTED PERSONNEL RECEIVE INSTRUCTION AT THE UNDERGRADUATE COLLEGE LEVEL.

THE CURRICULUM IS CAREFULLY ORGANIZED TO PROVIDE THE PRINCIPLES OF SCIENCE AND ENGINEERING NECESSARY FOR UNDERSTANDING THE OPERATION OF NAVAL NUCLEAR PROPULSION PLANTS. EACH SUBJECT SERVES AS A BUILDING BLOCK SUPPORTING THE STUDENTS FURTHER TRAINING. FOR EXAMPLE: THE REACTOR PLANT SYSTEMS SUBJECT MATTER SUPPORTS THE HEAT TRANSFER AND FLUID FLOW SUBJECT. MATHEMATICS SUPPORTS ALL SUBJECTS. PHYSICS SUPPORTS REACTOR PRINCIPLES, CHEMISTRY, AND RADIOLOGICAL FUNDAMENTALS SUBJECTS. ALL COURSES USE SHIPBOARD EXAMPLES WHEN EXPLAINING CONCEPTS. FOR EXAMPLE, IN MATHEMATICS THE INSTRUCTOR AVOIDS USING ABSTRACT EQUATIONS AND USES THE FORMULAS FROM THE SUBJECTS THAT WILL BE STUDIED AT THE SCHOOL.

CONTROL OF THE CURRICULUM STARTS WITH TOPICAL GUIDES. THERE IS A TOPICAL GUIDE FOR EVERY SUBJECT TAUGHT AT NUCLEAR POWER SCHOOL. THE TOPICAL GUIDE IS ORIGINATED BY THE NUCLEAR POWER SCHOOL STAFF, REVIEWED BY THE BETTIS LABORATORY, AND

APPROVED BY NAVAL REACTORS. THE PURPOSE OF A TOPICAL GUIDE IS TO REGULATE THE SUBJECT BY SPECIFYING WHAT MUST BE COVERED, THE ORDER IN WHICH THE TOPICS MUST BE COVERED, THE TIME ALLOTTED FOR EACH TOPIC, AND WHEN EXAMINATIONS MUST BE GIVEN. LESSON PLANS ARE DEVELOPED FROM THESE TOPICAL GUIDES FOR USE IN TEACHING A CLASS. IN ADDITION, STUDENT LEARNING OBJECTIVES ARE DEVELOPED FROM THE TOPICAL GUIDES. THESE OBJECTIVES TELL THE STUDENTS WHAT THEY SHOULD BE GETTING OUT OF THE COURSE.

THE BASIS FOR TEXTBOOK AND OTHER DOCUMENT SELECTION IS THAT THEY WILL DIRECTLY SUPPORT NUCLEAR POWER SUBJECTS, AS WELL AS INCLUDE ADDITIONAL INFORMATION TO CHALLENGE EVEN THE BEST STUDENT. MANUALS ARE PREPARED FOR NUCLEAR POWER SCHOOL FOR USE BY THE SCHOOL, THE PROTOTYPES, AND THE SHIPS IN THE FLEET. THESE MANUALS ARE PREPARED BY THE BETTIS OR KAPL LABORATORIES AND APPROVED BY NAVAL REACTORS PRIOR TO ISSUE. USE OF COMMERCIAL TEXTS FOR SOME SUBJECTS ARE APPROVED BY NAVAL REACTORS. REACTOR PLANT MANUALS AND OTHER TECHNICAL MANUALS ARE USED FOR INSTRUCTOR REFERENCE. BOOKS CONTAINING PRACTICE PROBLEMS FOR EACH SUBJECT ARE PREPARED BY THE NUCLEAR POWER SCHOOL AND GIVEN TO STUDENTS TO BE USED THROUGHOUT THE COURSE.

INSTRUCTOR QUALITY CONTROL

THE INITIAL TRAINING OF A NEW INSTRUCTOR TAKES ABOUT THREE MONTHS. DURING THIS INITIAL TRAINING THE NEW INSTRUCTOR IS FIRST

REQUIRED TO TAKE THE SUBJECT HE WILL TEACH. HE WILL GIVE PRACTICE LECTURES AND BECOME FAMILIAR WITH RELATED NUCLEAR POWER SCHOOL SUBJECTS. THE NEW INSTRUCTOR MUST PASS ORAL BOARDS ON THE TECHNICAL CONTENT OF THE COURSE, AND PRESENT A CERTIFICATION LECTURE FOR THE DIVISION DIRECTOR, THE DEPARTMENT HEAD, AND THE COMMANDING OFFICER. HE MUST ALSO PASS AN ORAL CERTIFICATION BOARD BY THE DIVISION DIRECTOR, THE DEPARTMENT HEAD, AND THE COMMANDING OFFICER. AFTER QUALIFICATION, THE TRAINING CONTINUES SO THAT THE INSTRUCTOR WILL REMAIN CURRENT AND KNOWLEDGEABLE. AN ANNUAL WRITTEN EXAMINATION IS ADMINISTERED TO ALL INSTRUCTORS TO DETERMINE ANY WEAK AREAS. THE INSTRUCTOR'S CLASSROOM PRESENTATION IS AUDITED AT LEAST TWICE DURING EACH PERIOD HE TEACHES A SUBJECT. THE COMMANDING OFFICER, THE EXECUTIVE OFFICER AND THE DEPARTMENT HEADS ARE REQUIRED TO AUDIT ONE INSTRUCTOR EACH WEEK. ALSO BETTIS TECHNICAL CONSULTANTS RANDOMLY MONITOR THE INSTRUCTORS. EVALUATION REPORTS ARE FILLED OUT BY THE AUDITORS AND DISCUSSED WITH THE INSTRUCTOR. THESE REPORTS ARE FORWARDED UP THE CHAIN OF COMMAND AND FILED IN THE INSTRUCTOR TRAINING FOLDER AFTER ANY NECESSARY CORRECTIVE ACTION HAS BEEN TAKEN.

EXAMINATIONS

BOTH OFFICER AND ENLISTED STUDENTS ARE REQUIRED TO PASS A FOUR HOUR WRITTEN COMPREHENSIVE EXAMINATION PRIOR TO GRADUATION. IN ADDITION, THERE ARE WEEKLY QUIZES AND A TWO HOUR EXAMINATION ABOUT EVERY TEN DAYS. NO MULTIPLE CHOICE OR TRUE AND FALSE QUESTIONS ARE USED ON ANY EXAMINATIONS AT NUCLEAR POWER SCHOOL.

QUESTIONS INVOLVE SINGLE AND MULTIPLE CONCEPTS WHICH REQUIRE ESSAY ANSWERS, DEFINITIONS, STATEMENTS OF FACTS, OR CALCULATIONS. THE PHILOSOPHY OF QUESTIONING IS TO EXAMINE THE STUDENT IN BASIC THEORY AND THE APPLICATION OF THIS THEORY TO THE PRINCIPLES OF OPERATION OF THE BASIC PLANT COMPONENTS AND SYSTEMS.

CAREFUL QUALITY CONTROL IS EXERCISED IN THE PREPARATION AND ADMINISTRATION OF EXAMINATIONS. EACH EXAMINATION IS WRITTEN AND REVIEWED BY TWO MEMBERS OF THE ACADEMIC DIVISION. A TRIAL EXAMINATION IS GIVEN TO ANOTHER MEMBER AS A CHECK ON ANY PROBLEMS WHICH MAY ARISE WITH THE QUESTIONS ON THE EXAMINATION OR THE TIME ALLOTTED FOR THE EXAMINATION. THE EXAMINATION IS THEN REVIEWED AND APPROVED BY THE ACADEMIC DIVISION DIRECTOR, THE DEPARTMENT HEAD, THE BETTIS TECHNICAL CONSULTANT AND FINALLY THE COMMANDING OFFICER. EXAMINATIONS ARE REVIEWED TO INSURE THAT THEY MEET THE OBJECTIVES OF THE SUBJECT TOPICAL GUIDES, ARE TECHNICALLY ACCURATE, AND HAVE ACCEPTABLE ANSWERS ON THE ANSWER KEYS. THEY MUST MEET THE STANDARDS OF DIFFICULTY FOR THE INDIVIDUAL QUESTIONS AND FOR THE TOTAL EXAMINATION.

AFTER THE EXAMINATION HAS BEEN GIVEN AND GRADED IT IS REVIEWED BY THE INSTRUCTOR WITH ALL OF HIS STUDENTS DURING THE NEXT CLASS PERIOD. AT THIS TIME THE INSTRUCTOR DISCUSSES THE CONCEPTS THAT GAVE THE STUDENTS THE MOST DIFFICULTY. IF A STUDENT FAILS AN EXAMINATION, THE INSTRUCTOR INTERVIEWS HIM TO ANALYZE HIS PERFORMANCE ON THE EXAMINATION, SO THAT CORRECTIVE ACTION CAN BE EFFECTIVE.

STUDENT CONTROL

STUDENT PERFORMANCE IS CONTINOUSLY MONITORED. INSTRUCTORS MONITOR STUDENT PERFORMANCE BY GRADING DAILY HOMEWORK, GIVING FREQUENT QUIZZES AND A 2 TO 3 HOUR EXAMINATION ABOUT EVERY 10 DAYS. ADVISORS MONITOR THE STUDENTS PERFORMANCE BY INTERVIEWING STUDENTS WHO HAVE ACADEMIC PROBLEMS WEEKLY, AND EVERY STUDENT AT LEAST EVERY TWO WEEKS. THE ADVISOR REVIEWS RECORDS OF STUDENT STUDY HOURS FOR CORRELATION WITH THE STUDENT'S ACADEMIC PERFORMANCE. IF THE STUDENT'S GRADES ARE BELOW AVERAGE HE IS REQUIRED TO SIGN IN WHENEVER HE STUDIES AT THE SCHOOL SO THAT HIS STUDY HOURS CAN BE CHECKED. THE ADVISOR ALSO MONITORS THE STUDENT BY ATTENDING THE LECTURES AND OBSERVING THE STUDENT'S PARTICIPATION. IN ADDITION, THE ADVISOR MEETS WITH ALL HIS STUDENT'S INSTRUCTORS AT LEAST EVERY TWO WEEKS TO DISCUSS INDIVIDUAL OR GROUP STUDENT PERFORMANCE. THE CLASS DIRECTOR MEETS WEEKLY WITH THE ADVISORS AND THE ADVISORS REPORT WEEKLY BY MEMORANDUM TO THE COMMANDING OFFICER VIA THE CHAIN OF COMMAND. THIS WEEKLY MEMO DISCUSSES ACADEMIC, MILITARY OR PERSONAL PROBLEMS THAT THE STUDENTS MAY HAVE.

THE SENIOR STAFF, THE COMMANDING OFFICER, EXECUTIVE OFFICER, AND ACADEMIC DEPARTMENT HEADS, OBSERVE ONE SECTION WEEKLY. THESE OBSERVATIONS COUPLED WITH GRADE REPORTS AND SECTION ADVISOR MEMOS, INSURE THAT THE CHAIN OF COMMAND IS CURRENT ON THE QUALITY OF STUDENT PERFORMANCE AND ON STUDENT PROBLEMS.

VARIOUS ACTIONS ARE AVAILABLE TO ASSIST STUDENTS WHO ARE HAVING DIFFICULTIES. THE ACTIONS DESIGNED TO CORRECT ACADEMIC DEFICIENCIES INCLUDE A MANDATORY STUDY PROGRAM IN WHICH STUDENTS ARE ASSIGNED A CERTAIN NUMBER OF HOURS TO STUDY ON A WEEKLY BASIS BASED ON THEIR GRADES. SOME WEAK STUDENTS ARE ASSIGNED WEEKEND REVIEW PACKAGES CONTAINING ADDITIONAL HOMEWORK QUESTIONS TO BE ANSWERED AND REVIEWED. IN ADDITION, STUDENTS ARE ASSIGNED SATURDAY MORNING MAKEUP WORK IF THEY HAVE NOT DEVOTED REASONABLE EFFORT ON THEIR HOMEWORK. WEAK STUDENTS ARE ASSIGNED INSTRUCTOR ASSISTANCE BY THEIR SECTION ADVISOR OR AN INSTRUCTOR FOR PERSONALIZED HELP. THERE ARE MANDATORY EXTRA INSTRUCTION SESSIONS WEEKLY FOR POOR STUDENTS IN EVERY SECTION.

IF REQUIRED, A STUDENT IS GIVEN EXAM FAILURE COUNSELLING. THE INSTRUCTORS AND SECTION ADVISORS REVIEW THE STUDENT'S EXAMINATION TO DETERMINE THE REASONS FOR HIS FAILURE, INCLUDING A CHECK OF HIS STUDY HABITS AND CLASSROOM NOTES. THEY THEN DEVELOP A CORRECTIVE STUDY PROGRAM FOR THE STUDENT.

IF A STUDENT HAS CONTINUALLY FAILED EXAMS HE GOES BEFORE AN ACADEMIC BOARD. THESE ACADEMIC BOARDS GIVE ORAL EXAMINATIONS TO DETERMINE A PARTICULAR STUDENT'S CURRENT LEVEL OF KNOWLEDGE AND HIS POTENTIAL TO SUCCESSFULLY COMPLETE THE COURSE. THE BOARD CAN RECOMMEND RETENTION ON ACADEMIC PROBATION OR THAT THE STUDENT BE DROPPED, DEPENDING ON THE KNOWLEDGE THE STUDENT SHOWS AT THE BOARD.

I APPROVE ALL OFFICER STUDENT DISENROLLMENTS FROM NUCLEAR POWER SCHOOL. A MEMBER OF MY STAFF APPROVES ALL ENLISTED STUDENT DISENROLLMENTS.

STUDENT RECORDS

COMPLETE RECORDS ARE MAINTAINED ON EACH STUDENT'S WORK AT NUCLEAR POWER SCHOOL. THIS INCLUDES ALL OF THE RESULTS OF HIS EXAMINATIONS, HIS PROGRESS AND EVERY PERSONAL COUNSELLING SESSION HE IS GIVEN. HIS COMMENT FOLDER WHICH CONTAINS SUMMARIES OF ALL COUNSELLING SESSIONS WHILE AT NUCLEAR POWER SCHOOL IS RETAINED FOR FIVE YEARS WHILE HIS CLASS STANDING AND COURSE AVERAGE IS MAINTAINED PERMANENTLY ON FILE.

PROTOTYPE OPERATIONAL TRAINING

Operational training is conducted at eight land-based Naval Reactors prototypes. Three are located at the Naval Reactors Facility, Idaho Falls, Idaho; four at West Milton, New York; and one at Windsor, Connecticut. These prototypes are owned and operated by the Department of Energy (DOE) primarily to provide research and test facilities for the DOE naval reactors laboratories. Instruction is provided by naval personnel and by civilian personnel from the Naval Reactors laboratories. The Navy provides some of the classroom and administrative facilities together with most of the operating crew for the prototype plant. The DOE in turn makes the plant available for training when it is not otherwise required for developmental testing.

At these prototypes, the Navy personnel in training receive lectures and on-the-job instruction in the practical aspects of reactor plant operation. They operate all of the equipment associated with the reactor plant under the supervision of qualified instructors. Officers qualify as Engineering Officer of the Watch. They must demonstrate a thorough knowledge of all the reactor plant and steam plant systems as well as the detailed operating criteria and procedures, and demonstrate the ability to perform operations on all watch stations in the prototype plant; they must demonstrate that they can take charge of the plant and put it through normal and casualty maneuvers.

ENLISTED MEN QUALIFY AS OPERATORS OF EQUIPMENT CONNECTED WITH THEIR PARTICULAR RATING. THIS QUALIFICATION CONSISTS OF DEMONSTRATING GENERAL KNOWLEDGE OF ALL REACTOR PLANT SYSTEMS AND DETAILED KNOWLEDGE OF THOSE ASSOCIATED WITH THEIR OWN RATING. THEY MUST QUALIFY ON THE WATCH STATIONS THEY WOULD NORMALLY STAND ABOARD SHIP, AND THEY MUST BE ABLE TO HANDLE NORMAL MAINTENANCE PROBLEMS ON THEIR EQUIPMENT.

I WANT TO MAKE IT CLEAR THAT THIS TRAINING IS ALL CARRIED OUT ON AN OPERATING PROTOTYPE PROPULSION PLANT, NOT ON A REACTOR SIMULATOR. AS FAR AS I AM CONCERNED, YOU CANNOT TAKE AN INEXPERIENCED PERSON AND TRAIN HIM ON A REACTOR SIMULATOR. EVERY TIME HE MAKES A MISTAKE ON A SIMULATOR, THE INSTRUCTOR STOPS AND MERELY MOVES SOME SWITCH BACK TO ITS PROPER POSITION AND THEN GOES ON. ON A SUBMARINE IF YOU MAKE A MISTAKE, THE REACTOR COULD SHUT DOWN WHEN THE SHIP IS SUBMERGED. IF THERE IS AN ENEMY RIGHT THERE, YOU CANNOT COME TO THE SURFACE AND REGROUP. IT IS IMPERATIVE THAT THE TYPE OF TRAINING BE GEARED TO THIS INCREASED LEVEL OF RESPONSIBILITY. YOU HAVE TO TRAIN PEOPLE TO REACT TO THE REAL SITUATION AT ALL TIMES; BUT IF THEY ARE TRAINED WITH A SIMULATOR, THEY TEND TO EXPECT THERE WILL BE NO CONSEQUENCES AS A RESULT OF THEIR ACTIONS. THIS SIMPLY WON'T WORK IN REAL LIFE.

SOME COMPANIES HAVE TRIED TO GET INTO THE BUSINESS OF BUILDING REACTOR SIMULATORS FOR US CLAIMING IT WILL ALLOW US TO TRAIN OUR PEOPLE FAST. THEN THEY CAN GRANT A CERTIFICATE THAT THE NAVY PEOPLE OPERATED A SIMULATOR. BUT I WANT TO KNOW THAT THEY CAN OPERATE A REAL HONEST-TO-GOODNESS REACTOR PLANT.

I WOULD SAY THAT FOR ANYONE DEALING WITH NUCLEAR POWER, IT IS TOO COMPLEX A TECHNOLOGY TO HAVE PEOPLE JUST GET AN IDEA HOW TO OPERATE A REACTOR BY LEARNING HOW TO THROW A FEW SWITCHES THAT CAN BE IMMEDIATELY CHANGED TO CORRECT AN ERROR. THE FACT THAT YOU WILL BE OPERATING A REACTOR IN A SHIP IN COMBAT WHERE PEOPLES' LIVES DEPEND ON YOUR PERFORMANCE GIVES YOU AN ENTIRELY DIFFERENT FEELING ABOUT THE IMPORTANCE OF PROPER TRAINING.

I GO OUT ON THE INITIAL SEA TRIALS OF EVERY NUCLEAR SHIP. MORE THAN HALF THE CREW HAVE NEVER BEEN TO SEA BEFORE. I AM TALKING ABOUT A BRAND NEW SHIP. YET I PUT THEM THROUGH THEIR PACES. I REQUIRE THEM TO EXERCISE THE SHIP AND THE PROPULSION PLANT TO ITS FULLEST. NOW, THIS IS A NEW CREW, AND THEY MUST DO ALL THESE THINGS WHEN THEY HAVE HAD LITTLE OR NO EXPERIENCE AT SEA. THEY HAVE NO OUTSIDERS TO ADVISE THEM, AND THEY MUST BE ABLE TO OPERATE THE SHIP CORRECTLY FOR ME TO BE SATISFIED. THE ONLY WAY THEY CAN DO THIS IS IF THEY HAVE BEEN PROPERLY TRAINED UNDER CIRCUMSTANCES IDENTICAL TO WHAT THEY ENCOUNTER

AT SEA. YOU CANNOT DO THIS WITH SIMULATORS.

INTRODUCTION TO PROTOTYPE TRAINING

TRAINING AT ANY ONE OF THE EIGHT PROTOTYPES IS CONDUCTED THE SAME WAY, AND IS BASED ON A FOUR-PHASE PROGRAM COVERING A 26 WEEK TRAINING PERIOD. A CLASSROOM PHASE, TRANSITION PHASE, IN-HULL PHASE AND PROFICIENCY PHASE MAKE UP THE BASIC PROTOTYPE TRAINING PLAN.

THE STUDENTS ARE ASSIGNED TO ONE OF THE PROTOTYPES UPON COMPLETION OF NUCLEAR POWER SCHOOL. WHEN THE CLASS ARRIVES, IT STARTS CLASSROOM TRAINING WHICH IS PRIMARILY CONDUCTED IN SPACES OUTSIDE THE PROTOTYPE HULL. AFTER FIVE WEEKS, THE STUDENT STARTS MAKING THE TRANSITION INTO THE HULL AND HE THEN BEGINS WATCHSTANDING TRAINING UNDER INSTRUCTION. THIS IS WHAT PROTOTYPE TRAINING IS ALL ABOUT; TO GIVE THE MAN IN-HULL EXPERIENCE OPERATING THE REACTOR PLANT, OPERATING EQUIPMENT VERY MUCH LIKE THAT HE WILL BE OPERATING AT SEA, USING PROCEDURES LIKE THOSE HE WILL BE USING AT SEA. THE MAJOR OBJECTIVE OF PROTOTYPE TRAINING IS TO MAKE THE BEST USE OF THE TRAINING THAT IS DONE IN THE HULL WITHIN THE CONSTRAINTS OF REACTOR SAFETY. AT THE CONCLUSION OF THE WATCHSTANDING TRAINING UNDER INSTRUCTION, THE MAN QUALIFIES BY PASSING WRITTEN AND ORAL EXAMS. THIS ALLOWS HIM TO STAND THE WATCH AND TO OPERATE THE EQUIPMENT ON HIS OWN--WITHOUT THE PRESENCE OF AN INSTRUCTOR. AFTER HE HAS QUALIFIED, AND IN THE PERIOD BEFORE HIS CLASS GRADUATES, HE STANDS WATCHES TO GAIN PROFICIENCY AS A WATCHSTANDER.

THERE ARE TWO REASONS WHY THE PROGRAM IS BASED ON THESE FOUR PHASES. FIRST, THIS IS A SYSTEMATIC APPROACH TO PREPARE THE MAN TO STAND WATCHES BY GETTING HIM TO LEARN THE SYSTEMS AND COMPONENTS HE WILL BE OPERATING, AND THEN ACTUALLY OPERATING THEM. IT IS A REPETITIVE PROCESS WHICH GOES FROM THEORY, TO HARDWARE FAMILIARITY, TO OPERATION. THE PREPARATION ENABLES A MORE EFFICIENT USE OF THE PROTOTYPE REACTOR PLANT WHEN THE MAN ENTERS THE WATCHSTANDING PHASE.

SECOND, WITH THIS FOUR-PHASE PROGRAM, TWO CLASSES FROM NUCLEAR POWER SCHOOL CAN BE ACCOMMODATED AT THE PLANT AT THE SAME TIME. AGAIN, THIS MAKES FOR THE BEST USE OF THE PROTOTYPE EQUIPMENT. THE TIME ONE CLASS STARTS INTO WATCHSTANDING TRAINING COINCIDES WITH THE TIME THE PREVIOUS CLASS QUALIFIED, AND THE TIME IT ENDS WATCHSTANDING TRAINING COINCIDES WITH THE TIME THE NEXT CLASS STARTS ITS WATCHSTANDING TRAINING.

PROTOTYPE CLASSROOM PHASE

THE CLASSROOM PHASE IS OF FIVE WEEKS DURATION. THIS PHASE CONSISTS PRIMARILY OF LECTURES, COUPLED WITH SOME PRACTICAL TRAINING.

IN THE CLASSROOM PHASE, THE STUDENT SPENDS 12 HOURS A DAY AT THE SITE, MONDAY THROUGH FRIDAY. DURING THIS TIME AN OFFICER GETS ABOUT 7 HOURS A DAY OF LECTURES AND EXAMINATIONS, AND AN ENLISTED MAN ABOUT 6 HOURS PER DAY. THE REMAINING FIVE TO SIX HOURS IS SPENT IN STUDY AT THE SITE.

THE LECTURES COVER THE MECHANICAL, ELECTRICAL, AND REACTOR SYSTEMS THAT ARE SPECIFIC TO THE PLANT TO WHICH THE TRAINEE IS ASSIGNED. IN ADDITION, HE RECEIVES LECTURES IN CHEMISTRY AND RADIOLOGICAL CONTROLS. IN MECHANICAL SYSTEMS, FOR EXAMPLE, THE OFFICER GETS THREE WEEKS OF CLASSROOM INSTRUCTION. ABOUT HALF OF THESE LECTURES COVER PRIMARY PLANT REACTOR MECHANICAL SYSTEMS AND THE OTHER HALF COVER THE SECONDARY STEAM PLANT MECHANICAL SYSTEMS.

YOU MAY ASK WHY THE STUDENT MUST GET SO MUCH CLASSROOM INSTRUCTION, SINCE HE HAS JUST FINISHED NUCLEAR POWER SCHOOL. AT NUCLEAR POWER SCHOOL HE WAS TAUGHT THE THEORETICAL BASIS FOR THE SYSTEMS; FOR EXAMPLE, HEAT TRANSFER AND FLUID FLOW. IN TEACHING THEORY AT NUCLEAR POWER SCHOOL, AN S5W SUBMARINE PLANT WAS USED AS THE PRIMARY EXAMPLE AS IT IS THE MOST NUMEROUS OF THE VARIOUS TYPES OF PROPULSION PLANTS IN USE IN THE FLEET. AT THE PROTOTYPE, THE STUDENT MUST LEARN THE SYSTEMS OF THE SPECIFIC PLANT (S1W, FOR EXAMPLE, IS THE PROTOTYPE OF THE NAUTILUS PROPULSION PLANT AND A1W IS AN AIRCRAFT CARRIER PROTOTYPE) TO WHICH

HE IS ASSIGNED RATHER THAN S5W SYSTEMS. ALTHOUGH THE OVERALL SYSTEM LAYOUTS ARE SIMILAR ON ALL THE PLANTS, THE STUDENT MUST LEARN THE DETAILS ABOUT THE SPECIFIC PLANT HE WILL OPERATE DURING HIS TRAINING AT THE PROTOTYPE.

THE MECHANICAL, ELECTRICAL, AND REACTOR LECTURES ARE ALL ORIENTED TO THE SPECIFIC PROTOTYPE. EACH MAN GETS THESE LECTURES FROM THE VIEWPOINT OF HIS JOB. FOR EXAMPLE, THE OFFICER GETS THESE LECTURES FROM THE VIEWPOINT OF HIS JOB AS A SUPERVISOR WITH REGARD TO THESE SYSTEMS.

AS HE GOES THROUGH THESE LECTURES, THE STUDENT HAS STUDY ASSIGNMENTS TO COMPLETE. WE CALL THESE HOMEWORK; BUT SINCE ALL THIS IS CLASSIFIED MATERIAL, THE STUDENT HAS TO COMPLETE IT AT THE SITE RATHER THAN AT HOME. ONE PART OF THESE STUDY ASSIGNMENTS REQUIRES THE STUDENT TO GET INTO THE HULL AND TRACE OUT THE PLANT SYSTEMS--HAND OVER HAND--FINDING OUT WHAT THEY LOOK LIKE AND WHERE THEY GO.

IN ADDITION TO THE MECHANICAL, ELECTRICAL AND REACTOR SYSTEMS, THE STUDENT GETS CHEMISTRY AND RADIOLOGICAL CONTROLS LECTURES. THE LECTURES IN CHEMISTRY AND RADIOLOGICAL CONTROLS ARE NOT SPECIFIC TO EACH PLANT--SINCE THESE AREAS ARE COMMON TO ALL REACTOR PLANTS. THE OFFICER STUDENT GETS MUCH MORE IN THIS AREA THAN THE ENLISTED STUDENT. THIS IS BECAUSE WE DO NOT TRAIN MOST ENLISTED PERSONNEL TO DO MUCH IN CHEMISTRY AND RADIOLOGICAL CONTROLS.

OTHER THAN WHAT IS NEEDED FOR THEIR OWN PERSONAL SAFETY AND TO DO THEIR JOBS. LATER, ENLISTED SPECIALISTS CALLED ENGINEERING LABORATORY TECHNICIANS ARE TRAINED IN CHEMISTRY AND RADIOLOGICAL CONTROLS. WE HAVE FOUND THAT IT TAKES THREE ADDITIONAL MONTHS TO TRAIN ENLISTED PERSONNEL TO BECOME SPECIALISTS IN THIS AREA. THE OFFICER, HOWEVER, MUST GET MORE AT THIS POINT BECAUSE HE WILL BE SUPERVISING THIS AREA.

WRITTEN EXAMINATIONS OF ONE TO TWO HOURS LENGTH ARE GIVEN EVERY WEEK. THERE IS NO COMPREHENSIVE WRITTEN EXAMINATION AT THE END OF THE CLASSROOM PHASE. INSTEAD, THE WEEKLY EXAM GRADES ARE USED BY THE STAFF TO IDENTIFY WEAK AREAS WHERE THE STUDENT WILL NEED EXTRA WORK. A BANK OF EXAMINATION QUESTIONS AND ANSWER KEYS IS MAINTAINED FOR ALL WRITTEN EXAMINATIONS GIVEN AT THE PROTOTYPE. EACH QUESTION AND ANSWER HAS BEEN REVIEWED INDEPENDENTLY FOR TECHNICAL ACCURACY, CLARITY, SCOPE AND DEPTH OF THE QUESTION. IN ADDITION, THE OVERALL EXAMINATION IS REVIEWED AND APPROVED BEFORE USE.

REQUIREMENTS HAVE BEEN ESTABLISHED ON THE REUSE OF QUESTIONS FROM THE EXAMINATION BANK IN SUBSEQUENT EXAMS. THERE ARE ALSO REQUIREMENTS ON THE TYPES OF QUESTIONS THAT ARE USED. FOR EXAMPLE, NO TRUE AND FALSE QUESTIONS ARE ALLOWED. ESSAY QUESTIONS AND PROBLEMS REQUIRING CALCULATIONS

MUST MAKE UP AT LEAST 40% OF THE EXAM. FINALLY, THE EXAM QUESTIONS AND ANSWERS ARE REVIEWED ANNUALLY FOR TECHNICAL ACCURACY AND CONTENT.

IF A STUDENT FAILS AN EXAMINATION, HE IS ASSIGNED A REMEDIAL UPGRADING PROGRAM TAILORED TO HIS INDIVIDUAL NEEDS. STAFF ADVISORS FOLLOW THE STUDENT'S PROGRESS DAILY TO ENSURE THAT THE REMEDIAL ASSIGNMENTS ARE COMPLETED. STUDENT COUNSELING IS IMPORTANT TO DETECT PROBLEMS EARLY BEFORE THE TRAINEE HAS FALLEN TOO FAR BEHIND. EACH STUDENT RECEIVES PERIODIC INTERVIEWS FROM PLANT SUPERVISORS. INTERVIEWS ARE REQUIRED AT LEAST EVERY TWO WEEKS, UPON ANY EXAMINATION FAILURE, OR FOR GENERALLY LOW GRADES. THE FREQUENCY OF THESE INTERVIEWS INCREASES TO WEEKLY IN LATER PHASES OF TRAINING.

ALL INTERVIEWS AND UPGRADING PROGRAMS ARE DOCUMENTED IN THE STUDENT'S RECORD. THESE RECORDS ARE ESSENTIAL IN THE EVENT THAT WE MUST DISENROLL THE STUDENT.

THE QUALITY OF LECTURES IS ASSURED THROUGH THE USE OF APPROVED LESSON PLANS AND BY MONITORING OF THE LECTURES. EACH INSTRUCTOR IS MONITORED AT LEAST ONCE DURING EACH CLASSROOM PHASE BY SENIOR NAVY OR CONTRACTOR MANAGEMENT. THE MONITOR HAS A COPY OF THE LESSON PLAN WITH HIM, AND HE FILLS OUT AN EVALUATION FORM WHICH IS REVIEWED BY THE INSTRUCTOR AND HIS SUPERVISOR.

PROTOTYPE TRANSITION PHASE

The Prototype Transition Phase starts at week six after completion of the classroom training. At the start of the transition phase, the students are divided into four groups and each group is assigned to a crew. They go on an eight hour rotating shift schedule, so there is always one crew operating and training on the plant, 24 hours a day and seven days a week. After their eight hour shift as the crew in the hull, the students and staff work additional hours. The students continue to work at least 60 hours a week during this period.

Two major training efforts are involved in the transition phase; systems training, and the beginning of watchstanding qualification. The systems training requires more detailed study than the student was exposed to in classroom phase lectures. It is primarily a self study of each plant system, followed by a one-half to two hour oral checkout of that system, The student starts standing training watches in-hull at about the ninth week. During the transition phase some students stand watches in-hull; some study for a system checkout and some are receiving these system checkouts.

In systems training, the student first learns the individual system and its components, then the interrelationship between the systems -- how they affect or interface with each other -- and finally how to operate all of the individual systems as an integrated plant. The document that tells the student what he

NEEDS TO KNOW ABOUT A PARTICULAR SUBJECT, AND TELLS THE INSTRUCTOR ON WHAT HE SHOULD EXAMINE THE STUDENT, IS CALLED THE QUALIFICATION STANDARD. THE QUALIFICATION STANDARD CONTAINS A PLACE FOR ALL THE CHECKOUT SIGNATURES THE STUDENT MUST GET DURING HIS SIX MONTH PERIOD AT THE PROTOTYPE. THESE SIGNATURES VERIFY THAT THE STUDENT HAS COMPLETED A GIVEN PORTION OF HIS TRAINING. EVENTUALLY THIS BECOMES THE LEGAL RECORD OF THE STUDENTS QUALIFICATION. ONLY AUTHORIZED INSTRUCTORS CAN GIVE THESE SIGNATURES, AND A SYSTEM IS USED WHEREBY CERTAIN SIGNATURES ARE EMBOSSED TO GUARD AGAINST IMPROPER SIGNING OF THE QUALIFICATION RECORD. EXAMPLES OF THE TYPE OF KNOWLEDGE REQUIRED BY THE QUALIFICATION STANDARD FOR A SYSTEM OR COMPONENT ARE "EXPLAIN THE FUNCTIONS OF THE SYSTEM "OR, AFTER HAVING PHYSICALLY TRACED THE SYSTEM IN THE PLANT, "DRAW A ONE-LINE SKETCH OF THE SYSTEM FROM MEMORY; USING APPROPRIATE SYMBOLS AND NOMENCLATURE AND SHOWING THE ITEMS LISTED BELOW."

THE QUALIFICATION STANDARD PLAYS AN EQUALLY IMPORTANT ROLE IN WATCHSTANDING TRAINING AND QUALIFICATION. HERE IT INDICATES THE PRACTICAL FACTORS AND TRAINING WATCH REQUIREMENTS THAT THE STUDENT MUST MEET.

THE SECOND MAJOR TYPE OF TRAINING DURING TRANSITION PHASE IS WATCHSTANDING. TO QUALIFY AT THE PROTOTYPE, ALL STUDENTS ARE REQUIRED TO STAND A GIVEN MINIMUM NUMBER OF WATCHES UNDER THE INSTRUCTION OF QUALIFIED STAFF WATCHSTANDERS. DURING

THESE WATCHES, THE STAFF WATCHSTANDER IS RESPONSIBLE FOR THE WATCH STATION; HOWEVER, HE FULFILLS THIS RESPONSIBILITY BY USING THE STUDENT TO CARRY OUT WATCHSTANDING DUTIES.

DURING THESE WATCHES, THE STUDENT IS EXPECTED TO ACT AS IF HE WERE RESPONSIBLE FOR THAT WATCH. THE STAFF INSTRUCTOR WATCHES EACH MOVE AND STOPS AND CORRECTS THE STUDENT IF HE STARTS TO MAKE A MISTAKE.

THE STUDENT IS GRADED ON EACH WATCH, AND MUST RECEIVE A SATISFACTORY GRADE OR HE DOES NOT GET CREDIT FOR THE WATCH. THE STUDENT IS EXPECTED TO SIGNIFICANTLY IMPROVE HIS WATCHSTANDING CAPABILITY AS HE GAINS EXPERIENCE OF EACH WATCHSTATION. THIS FACTOR IS TAKEN INTO ACCOUNT WHEN ASSIGNING HIM A GRADE.

DURING THE WATCH, THERE ARE PRESCRIBED THINGS THE STUDENT MUST DO, SUCH AS STARTING UP AND SHUTTING DOWN A PIECE OF EQUIPMENT. THESE ARE CALLED "PRACTICAL FACTORS." THE STUDENT DOES THESE UNDER INSTRUCTION, WITH THE STAFF INSTRUCTOR PROVIDING DIRECT SUPERVISION. THE EMPHASIS IS ON THE STUDENT DOING THE OPERATION HIMSELF. THIS IS ACCOMPLISHED BY FIRST TALKING THROUGH THE OPERATION AND THEN LETTING THE STUDENT PERFORM IT. THE STAFF INSTRUCTOR ASKS THE STUDENT SUCH THINGS AS: "HOW ARE YOU GOING TO START UP THAT PUMP?"; "SHOW ME THE PROCEDURE"; "DISCUSS EACH STEP WITH ME"; "WHAT IS THE PURPOSE BEHIND THAT STEP?"; "WHAT WOULD HAPPEN IF YOU DID NOT DO THAT

STEP?"; "WHAT ELSE IN THE PLANT WILL BE AFFECTED BY IT?" THIS SORT OF QUESTIONING IS IMPORTANT BECAUSE IT ALLOWS THE INSTRUCTOR TO DETERMINE IF THE STUDENT UNDERSTANDS WHY HE DOES A PARTICULAR THING, RATHER THAN THE LATTER MERELY KNOWING THAT HE MUST TURN A SWITCH OR OPEN A VALVE.

PROTOTYPE PLANT OPERATIONS ARE SCHEDULED TO COINCIDE WITH THE EXTENT THE CLASS HAS PROGRESSED THROUGH THE TRAINING PROGRAM. FOR THE FIRST STUDENT TRAINING WATCHES, THE PLANT IS HELD IN A STEADY-STATE STEAMING CONDITION. THIS MEANS THE REACTOR IS AT A CONSTANT POWER AND A STEADY-STATE CONDITION EXISTS IN THE ENGINEROOM. LATER ON, THE SCHEDULE CALLS FOR MORE COMPLICATED OPERATIONS, SUCH AS STARTUPS AND SHUTDOWNS OF THE STEAM PLANT, STARTUPS AND SHUTDOWNS OF THE REACTOR, AND CASUALTY DRILLS. IT IS IMPORTANT TO NOTE THAT IN THE CASE OF THE OFFICER STUDENT QUALIFYING AS ENGINEERING OFFICER OF THE WATCH, HE NOT ONLY STANDS TRAINING WATCHES AND COMPLETES PRACTICAL FACTORS AS ENGINEERING OFFICER OF THE WATCH, BUT ALSO STANDS WATCH AT THE ENLISTED WATCH STATIONS AND DOES PRACTICAL FACTORS THERE ALSO.

THIS GIVES THE OFFICER A BETTER OVERALL FEEL FOR WHAT IS HAPPENING THROUGHOUT THE PLANT. AS AN EXAMPLE, AT ONE OF OUR PROTOTYPES THE OFFICER STUDENT MUST STAND A MINIMUM OF ABOUT 180 HOURS OF TRAINING WATCHES OF WHICH SEVENTY PER CENT ARE DEVOTED TO WATCHES OTHER THAN ENGINEERING OFFICER OF THE WATCH.

During watchstanding training, the student is also instructed on proper communications procedures and formality in communications. He is also instructed in logkeeping and other normal duties of a watchstander.

Other training conducted during the transition phase include lectures, seminars and training exercises. A series of lectures are given which are detailed and specific for each enlisted rating, and for the officers. These lectures are given on subjects where experience has shown that more emphasis is needed to get the message through to the student. This series is about 40 hours long. For officers it covers reactor plant instruments and control, electrical equipment and control, and the main turbine.

Two other types of training are started during transition phase; seminars and training exercises. Experience has shown that training in different forms is necessary to provide a sound basis for operation and for the kinds of engineering judgement that will be needed at sea. In addition, repetition and different forms of training are required to obtain adequate retention.

In the transition phase, the student receives training through seminars. These seminars are required on watchstanding principles, such as

WATCH RELIEF PROCEDURES, COMMUNICATIONS, FORMALITY, PROCEDURAL COMPLIANCE, TAGOUTS, CASUALTY CONTROL, LOGS, AND PLANT AWARENESS. ALSO, SEMINARS ARE REQUIRED ON REACTOR STARTUP AND SHUTDOWN.

A SEMINAR IS NOT A LECTURE. THE IDEA OF SEMINAR TRAINING IS TO GET THE STUDENTS INVOLVED. THEY MUST PARTICIPATE IN AN ACTIVE MANNER, AND SHOW SATISFACTORY KNOWLEDGE. OTHERWISE THEY DO NOT RECEIVE CREDIT FOR PARTICIPATING. WE HAVE MADE A STRONG EFFORT TO ENFORCE THE IDEA THAT A SEMINAR IS NOT A LECTURE, BUT MORE LIKE A "DRILL IN THE CLASSROOM." THESE SEMINARS ARE DESIGNED TO GET THE STUDENT TO THINK HIS WAY THROUGH A PROBLEM AND REACH A SOLUTION. AS WITH ALL OTHER TRAINING, THERE ARE WRITTEN REQUIREMENTS FOR THE CONDUCT OF SEMINARS. FOR EXAMPLE, AN APPROVED SEMINAR GUIDE MUST BE FOLLOWED BY THE INSTRUCTOR, WHO IS CALLED THE SEMINAR LEADER AND WHO HAS BEEN FORMALLY TRAINED AND QUALIFIED TO CONDUCT SEMINARS. IN ADDITION, THE NUMBER OF STUDENTS IS RESTRICTED TO SEVEN, AS THIS HAS BEEN SHOWN BY EXPERIENCE TO BE THE MAXIMUM NUMBER OF PARTICIPANTS FOR AN EFFECTIVE SEMINAR.

THE OTHER TYPE OF TRAINING STARTED DURING THE TRANSITION PHASE IS "TRAINING EXERCISES." THESE ARE SESSIONS OF ONE TO FOUR HOURS DURATION IN WHICH THE STUDENT PARTICIPATES IN TRAINING OUTSIDE THE HULL. THESE ARE LIMITED TO GROUPS OF SEVEN OR EIGHT STUDENTS WITH AN INSTRUCTOR. WE HAVE FOUND THAT TRAINING EXERCISES WHERE THERE IS MUCH REPETITION IS

REQUIRED FOR THE STUDENTS TO BECOME REASONABLY PROFICIENT IN CERTAIN SKILLS.

ALL STUDENTS PARTICIPATE IN TRAINING EXERCISES COVERING SUCH THINGS AS DAMAGE CONTROL, WHERE THE STUDENT DONS AND TAKES OFF EMERGENCY BREATHING EQUIPMENT, AND USE OF FIRE FIGHTING EQUIPMENT. ALSO TRAINING IS CONDUCTED IN WHICH THE STUDENT DEMONSTRATES PROPER TECHNIQUES FOR WORKING WITH RADIOLOGICAL CONTROLS. EACH TRAINING EXERCISE IS CONDUCTED USING A PLAN, EACH IS GRADED AND MUST BE SATISFACTORILY PASSED TO GET A SIGNATURE. WHILE HE IS AT THE PROTOTYPE, THE STUDENT WILL GET SEVENTEEN TRAINING EXERCISES TOTALING FIFTY-SIX HOURS. DURING TRANSITION PHASE HE GETS ABOUT TWENTY HOURS.

FINALLY, WRITTEN EXAMINATIONS ARE GIVEN AT THE END OF THE TRANSITION PHASE. AS IN THE CLASSROOM PHASE, THE STUDENT IS ASSIGNED A REMEDIAL PROGRAM IF HE DOES NOT PASS.

DURING TRANSITION PHASE IT IS IMPORTANT TO CAREFULLY FOLLOW THE PROGRESS OF EACH STUDENT'S TRAINING. SEVERAL METHODS ARE USED TO FOLLOW PROGRESS. FIRST, CONSIDERABLE EFFORT IS EXERTED TO PLAN AND SCHEDULE THE TRAINING. THIS BECOMES PARTICULARLY IMPORTANT AT THE START OF THE TRANSITION PHASE, BECAUSE OF THE MANY DIFFERENT TYPES OF TRAINING GIVEN DURING THIS PHASE, THE CONSIDERABLE SELF-STUDY REQUIRED, THE INDIVIDUALS CHECKOUTS, AND THE WATCHSTANDING REQUIREMENTS.

PLANNING STARTS WITH A NINE MONTH ACTIVITY SCHEDULE. THIS SCHEDULE LAYS OUT FOR EACH PLANT THE OPERATING TIME AND THE TIME THE PLANT IS SCHEDULED TO BE SHUTDOWN FOR MAINTENANCE OR CONDUCTING SPECIAL TESTING.

BASED ON THIS NINE MONTH ACTIVITY SCHEDULE, A DETAILED TRAINING EVENTS SUMMARY CHART IS DEVELOPED. THIS SUMMARY IS THEN BROKEN DOWN INTO WEEKLY SCHEDULES FOR EACH CREW, WHICH ARE PREPARED AND APPROVED EACH WEEK BY THE PLANT TRAINING MANAGER. THESE WEEKLY SCHEDULES LIST STUDENT AND INSTRUCTOR ASSIGNMENTS BY NAME.

THE PLANT EVOLUTIONS ARE SCHEDULED ON A SHIFT-BY-SHIFT BASIS FOR THE WEEK, IN SUCH A WAY AS TO PHASE IN THE OPERATIONS AND TRAINING NEEDS. WATCH BILLS ARE ISSUED FOR THE STAFF INSTRUCTORS MANNING THE WATCH, AND A STUDENT WATCH BILL IS ALSO ISSUED FOR THE TRAINEES AT THOSE WATCH STATIONS.

INDIVIDUAL STUDENT PROGRESS IS FOLLOWED ON A DAILY BASIS. IN THE QUALIFICATION SIGNATURE BOOK A POINT VALUE IS ESTABLISHED FOR SIGNATURES RECEIVED BY THE STUDENT. HE IS REQUIRED TO GET A GIVEN NUMBER OF POINTS AS HE PROGRESSES THROUGH THE TRAINING. HE MUST STAY UP WITH HIS EXPECTED PROGRESS CURVE; IF HE FALLS TOO FAR BEHIND, HE WILL BE ASSIGNED REMEDIAL PROGRAMS WHICH MAY REQUIRE HIM TO SPEND EXTRA HOURS AT THE PROTOTYPE.

FINALLY, SURVEILLANCE INSPECTIONS AND PERIODIC AUDITS ARE CONDUCTED TO ASSURE THAT THE TRAINING PROGRAM IS BEING CONDUCTED AS PLANNED. THESE AUDITS GET INTO EVERY PHASE OF THE TRAINING BY USING A PRE-SELECTED AUDIT PLAN. I WILL DISCUSS THE AUDIT SYSTEM LATER.

PROTOTYPE IN-HULL PHASE

THE THIRD PHASE OF PROTOTYPE TRAINING IS THE IN-HULL PHASE. EARLY IN THE PERIOD, THE STUDENT WILL FINISH HIS SYSTEMS CHECKOUTS. BY THIS TIME HE WILL HAVE SPENT ABOUT FOUR HOURS LEARNING AND BEING CHECKED OUT ON EACH OF ABOUT 60 SYSTEMS. THE STUDENT ALSO COMPLETES HIS WATCHSTANDING REQUIREMENTS. WATCHES ARE PLANT CONTROLLING AND CANNOT BE WASTED. IF STUDENTS DO NOT PREPARE, THE FULL BENEFIT OF THE TRAINING WILL NOT BE REALIZED. AT THIS POINT THE STUDENT IS USUALLY TOO INEXPERIENCED TO GRASP THE COMPLEXITY OF THE WATCH STATION AND, THEREFORE, HE MUST BE GUIDED IN HIS STUDY. THIS IS DONE IN SEVERAL WAYS. FIRST, THE STUDENT KNOWS WHICH WATCH HE WILL BE STANDING BECAUSE HE IS ASSIGNED TO IT BY THE STUDENT WATCH BILL. HE WILL ALSO KNOW WHAT OPERATIONS ARE SCHEDULED IN THE PLANT.

SECOND, FOR EACH WATCH, THE STUDENT MUST COMPLETE PRE-WATCH HOMEWORK ASSIGNMENTS THAT RELATE TO THE PLANT OPERATING OR CASUALTY PROCEDURES THAT WILL BE USED DURING THE WATCH. THIRD, BEFORE STANDING A TRAINING WATCH DURING WHICH THE WATCH DUTIES

ARE ACTUALLY ASSUMED, THE STUDENT STANDS A NUMBER OF WATCHES AS AN OBSERVER, TO NOTE WHAT IS GOING ON. IN SOME OBSERVER WATCHES A SEPARATE STAFF INSTRUCTOR IS ASSIGNED TO PROVIDE MORE DETAILED TRAINING FOR THE STUDENT. THIS IS TO ACCELERATE THE STUDENT'S ACQUISITION OF KNOWLEDGE BEFORE HE ACTUALLY STANDS THE WATCH. FINALLY, THE STUDENT ASSUMES THE TRAINING WATCH UNDER INSTRUCTION.

EACH WATCH IS GRADED AND THE STUDENT MUST RECEIVE A SATISFACTORY GRADE TO GET CREDIT FOR THE WATCH. A STUDENT MUST STAND A SPECIFIED MINIMUM NUMBER OF SATISFACTORY WATCHES IN ORDER TO QUALIFY. FOR EXAMPLE, FOR AN OFFICER STUDENT TEN SATISFACTORY WATCHES ARE REQUIRED AT THE ENGINEERING OFFICER OF THE WATCH (EOOW) WATCH STATION. MOST STUDENTS STAND MORE THAN THE MINIMUM NUMBER IN ORDER TO BECOME SUFFICIENTLY PROFICIENT TO PASS THE FINAL EVALUATED WATCH.

A STANDARD FORM IS USED TO EVALUATE EACH WATCH. THIS FORM REQUIRES THE STUDENT TO BE GRADED IN NINE SPECIFIC AREAS. IF HE FAILS A WATCH, HE IS ASSIGNED A REMEDIAL PROGRAM WHICH REQUIRES THE STUDENT TO DO THINGS DIRECTLY RELATED TO THAT WATCH AND HE MUST COMPLETE THIS PROGRAM BEFORE HIS NEXT WATCH ON THAT STATION.

OFFICERS RECEIVE A FINAL EVALUATED WATCH WHICH MUST BE PASSED IN ORDER TO QUALIFY. THIS IS EVALUATED BY A BOARD

COMPOSED OF THREE PEOPLE; ONE OF MY REPRESENTATIVES FROM THE LOCAL NAVAL REACTORS FIELD OFFICE, A SENIOR REPRESENTATIVE OF THE PLANT MANAGEMENT, AND THE STAFF ENGINEERING OFFICER OF THE WATCH ON-WATCH INSTRUCTOR. THIS THREE MAN BOARD IS CONVENED FOR THE PURPOSE OF OBSERVING THE STUDENT'S PERFORMANCE DURING THIS WATCH. EACH OF THE THREE BOARD MEMBERS INDEPENDENTLY GRADES THE WATCH. THE STUDENT MUST RECEIVE A PASSING GRADE FROM ALL THREE. AS PREVIOUSLY POINTED OUT, THE STUDENT MUST PASS THIS WATCH IN ORDER TO QUALIFY.

I HAVE CERTAIN OPERATING PHILOSOPHIES THAT RELATE TO STUDENT WATCHSTANDING: THE PLANTS ARE OPERATED BY DETAILED WRITTEN PROCEDURES. STRICT COMPLIANCE TO THESE PROCEDURES IS REQUIRED AND ENFORCED. THE SHIPBOARD PLANT OPERATING MANUALS CONTAIN THESE PROCEDURES. A STRONG EFFORT HAS BEEN MADE TO MAKE THE PROTOTYPE MANUALS AS MUCH LIKE THOSE USED ON THE SHIPS AS POSSIBLE.

THIS IS ESSENTIAL IN THE OVERALL TRAINING OF THE STUDENT. HE SEES THE SAME KINDS OF OPERATING PROCEDURES, HE USES THE SAME KINDS OF EQUIPMENT RIGHT DOWN TO THE SAME TORQUE WRENCH, FOR EXAMPLE; HE IS TRAINED TO THE SAME KINDS OF QUALIFICATION STANDARDS AND USE THE SAME TEXT BOOKS AS ARE USED THROUGHOUT THE NAVAL NUCLEAR PROGRAM, INSOFAR AS THIS IS POSSIBLE.

EQUIPMENT IS LOGGED AND MONITORED JUST AS IT IS DONE ON

BOARD SHIP. I REQUIRE THAT THE PROTOTYPE PLANT BE OPERATED JUST AS WOULD A SHIP AT SEA, TO THE GREATEST EXTENT POSSIBLE. IN THIS WAY, STUDENTS GET THE ACTUAL LIVE EXPERIENCE OF KNOWING WHAT TO DO WHEN VALVES LEAK OR EQUIPMENT DOES NOT WORK, JUST AS THOUGH IT WERE HAPPENING AT SEA.

DURING THE IN-HULL PERIOD THE STUDENT FINISHES THE SEMINARS AND TRAINING EXERCISES THAT ARE REQUIRED FOR QUALIFICATION. THESE SEMINARS AND TRAINING EXERCISES INVOLVE MORE COMPLEX OPERATIONS AND CASUALTIES. THE STUDENT MUST SHOW THAT HE KNOWS WHAT IS EXPECTED TO OCCUR DURING CHANGING PLANT CONDITIONS, AND THAT HE CAN RECOGNIZE THE SYMPTOMS OF CASUALTIES AND TAKE THE PROPER CORRECTIVE ACTIONS.

DURING THIS PERIOD, THE STUDENT ALSO PARTICIPATES IN ABOUT 65 HOURS OF DISCUSSIONS WITH A STAFF INSTRUCTOR DURING WHICH HE TALKS THROUGH VARIOUS OPERATING AND CASUALTY PROCEDURES. IN GENERAL, THESE ARE THE PROCEDURES WHICH DO NOT ARISE DURING WATCHSTANDING. IF THE STUDENT HAS ALREADY DONE ANY OF THOSE WHILE HE WAS ON WATCH, HE NEED NOT REPEAT THEM.

IN THE LAST FEW WEEKS BEFORE QUALIFICATION, THE STUDENT RECEIVES A DETAILED REVIEW OF THE INTEGRATED PLANT. HE AND A STAFF ENGINEERING OFFICER OF THE WATCH GO OVER THE ENTIRE PLANT OPERATIONS, INCLUDING HOW THE INDIVIDUAL SYSTEMS ARE TIED TOGETHER AND HOW THEY INTERACT OR INTERFACE WITH ONE

ANOTHER. THESE DISCUSSIONS ARE STRUCTURED TO INCREASE THE STUDENT'S OVERALL PLANT KNOWLEDGE AND TO PREPARE HIM FOR HIS FINAL ORAL BOARD.

AT END-OF-CARD CHECKOUT THE STUDENT IS CONDUCTED BY A STAFF INSTRUCTOR FOR TWO HOURS IN EACH OF SIX AREAS. BY "END-OF-CARD" I MEAN THAT THE STUDENT HAS COMPLETED ALL OF THE REQUIRED TRAINING IN THE QUALIFICATION STANDARD. THESE CHECKOUTS ARE DONE JUST PRIOR TO FINAL ORAL BOARDS. THEY COVER MECHANICAL, ELECTRICAL, AND REACTOR OPERATIONS; THE STEAM PLANT, THE CHEMISTRY AND RADIOLOGICAL CONTROL AREAS, AND INTEGRATED PLANT OPERATIONS.

FINALLY, DURING THE IN-HULL WATCHSTANDING PERIOD, EACH STUDENT GETS WHAT IS CALLED A PROGRESS ORAL BOARD WHEN HE IS ABOUT 50% AND 80% OF THE WAY THROUGH QUALIFICATION. THESE BOARDS ARE ONE TO TWO HOURS LONG AND ARE CONDUCTED IN THE SAME MANNER AS A FINAL QUALIFICATION BOARD.

PROGRESS OF THE CLASS AND OF EACH STUDENT IS AGAIN CAREFULLY MONITORED DURING IN-HULL TRAINING. HERE WE LOOK FOR HOW WELL HE IS PROGRESSING IN HIS WATCHSTANDING, TRAINING AREAS, DISCUSSIONS, ETC. IF A STUDENT FALLS BEHIND HE WILL BE ASSIGNED REMEDIAL PROGRAMS.

PROTOTYPE QUALIFICATION CRITERIA

UP TO THIS POINT IN THE TRAINING PROGRAM THE STUDENT'S PROGRESS HAS BEEN MEASURED ALMOST ENTIRELY BY WRITTEN EXAMINATIONS. AS HE MOVES INTO THE ACTUAL PROCESS OF QUALIFYING ON THE PROTOTYPE REACTOR PLANT, THE METHODS OF MEASURING HIS KNOWLEDGE AND ABILITY CHANGE. HE IS NOW REQUIRED TO DEMONSTRATE HIS PERFORMANCE BY THREE DIFFERENT MEANS: WATCHSTANDING ABILITY, KNOWLEDGE AS DEMONSTRATED ON A COMPREHENSIVE WRITTEN EXAMINATION, AND KNOWLEDGE DEMONSTRATED ON AN ORAL BOARD. DIFFERENT PEOPLE AT THE PROTOTYPE ARE INVOLVED IN MAKING THESE EVALUATIONS. THEY ARE NOT BASED ON AN INDIVIDUAL DECISION. EACH WATCH IS USUALLY GRADED BY DIFFERENT PEOPLE, WHILE THE FINAL EVALUATED WATCH REQUIRES A UNANIMOUS GROUP DECISION FOR QUALIFICATION.

THE WRITTEN COMPREHENSIVE EXAM CONSISTS OF QUESTIONS SELECTED SO THAT EACH WRITTEN EXAMINATION IS DIFFERENT. ADDITIONALLY, THE THREE MEMBERS OF THE FINAL ORAL BOARD MUST UNANIMOUSLY AGREE THAT THE INDIVIDUAL IS QUALIFIED.

THIS BRINGS ME TO THE MEANING OF QUALIFICATION. IT IS A PASS/FAIL GRADE FOR THE STUDENT. IF HE PASSES IT MEANS THAT

THE PLANT STAFF, BOTH NAVY AND THE CONTRACTOR, ARE WILLING TO LET HIM STAND THE WATCH ON HIS OWN. IT MEANS THAT THE PLANT MANAGER IS WILLING TO ASSUME RESPONSIBILITY FOR SAFETY OF THE PLANT WHEN IT IS BEING OPERATED BY THIS QUALIFIED STUDENT. THE CONTRACTOR IS THUS SAYING THAT FROM A REACTOR SAFETY VIEWPOINT HE IS WILLING TO LET THE MAN OPERATE THE PLANT. IF THE CONTRACTOR CAN NOT SAY THIS, THEN OBVIOUSLY WE SHOULD NOT LET HIM GO ON TO OPERATE A SUBMARINE OR SURFACE SHIP IN THE FLEET.

THERE ARE FOUR PERFORMANCE AREAS THAT THE STUDENT MUST PASS TO BECOME QUALIFIED:

FIRST, THE STUDENT MUST HAVE A SATISFACTORY FINAL WATCHSTANDING GRADE. I HAVE MENTIONED THAT EACH WATCH WAS GRADED. THIS GRADE IS THE AVERAGE RECEIVED FOR THE WATCHES HE STOOD UNDER INSTRUCTION. THE GRADING BECOMES MORE SEVERE FOR LATER WATCHES AS MORE IS EXPECTED OF THE STUDENT AND THE PLANT OPERATIONS BECOME MORE COMPLEX.

SECOND, FOR OFFICER STUDENTS, A FINAL EVALUATED WATCH MUST BE PASSED. THIS IS DONE BY A BOARD OF THREE MEMBERS AS NOTED PREVIOUSLY. IF THE STUDENT FAILS THIS WATCH, HE COMPLETES REMEDIAL TRAINING AND TRIES AGAIN, AFTER BEING UPGRADED IN HIS WEAK AREAS. TYPICALLY, HE WILL NOT BE GIVEN MORE THAN TWO TO THREE CHANCES BEFORE A DECISION IS MADE ON WHETHER HE SHOULD BE DISENROLLED.

THIRD, THE STUDENT MUST PASS A FINAL COMPREHENSIVE WRITTEN EXAMINATION. THESE ARE DRAWN FROM AN EXAMINATION BANK AND COVER EACH OF THE AREAS OF MECHANICAL, ELECTRICAL, REACTOR, CHEMISTRY, RADIOLOGICAL CONTROLS, AND THE OVERALL PLANT. THE EXAM IS FOUR HOURS IN LENGTH FOR ENLISTED PERSONNEL AND EIGHT HOURS FOR OFFICERS. THESE EXAMINATIONS ARE GRADED AND REVIEWED WITH THE STUDENT PRIOR TO HIS FINAL ORAL BOARD. IF THE STUDENT FAILS IN ANY AREA, HE IS REEXAMINED AFTER AN UPGRADING PROGRAM. IF HE FAILS A REEXAMINATION, HE WILL NORMALLY BE DISENROLLED FROM THE SCHOOL.

LASTLY, EACH STUDENT RECEIVES A FINAL ORAL BOARD. THIS IS A GOOD TECHNIQUE FOR PROBING HIS KNOWLEDGE IN DEPTH; IT IS MUCH EASIER, IN THIS WAY TO ASSESS WHAT THE STUDENT ACTUALLY KNOWS, SINCE EVERY FLAW IN HIS ANSWERS CAN BE NOTED. ANY SIGNIFICANT KNOWLEDGE WEAKNESS IN REACTOR SAFETY WILL CAUSE THE STUDENT TO FAIL THE BOARD.

MEMBERS OF THE ORAL BOARD ARE ALERTED TO THE STUDENT'S WEAK AREAS BY HAVING REVIEWED HIS RECORD. THEY CAN THEREFORE PROBE AREAS IN SUFFICIENT DEPTH. ONLY SPECIFIC PERSONNEL ARE AUTHORIZED TO PARTICIPATE AS BOARD MEMBERS. FOR OFFICER STUDENTS, FOR EXAMPLE, THE FINAL BOARD IS COMPOSED OF FOUR MEMBERS: A MEMBER OF THE CONTRACTOR PLANT MANAGEMENT; A MEMBER OF MY NAVAL REACTORS FIELD OFFICE STAFF OR THE NUCLEAR

POWER TRAINING UNIT STAFF; A COMMISSIONED OFFICER FROM THE PLANT STAFF; AND AN ENGINEERING OFFICER OF THE WATCH. A FAILING GRADE ASSIGNED IN ANY AREA BY ANY BOARD MEMBER CAUSES THE STUDENT TO FAIL THE BOARD.

IN THE EVENT OF FAILURE, HE WILL BE GIVEN A RE-BOARD AFTER REMEDIAL TRAINING. FOR THE RE-BOARD, THE MEMBERS REQUIRED ARE HIGHER LEVEL MANAGERS. FOR EXAMPLE, FOR THE RE-BOARD OF AN OFFICER STUDENT, USUALLY THE PLANT MANAGER, ONE OF MY REPRESENTATIVES FROM THE LOCAL NAVAL REACTORS FIELD OFFICE, THE COMMANDING OFFICER OF THE NUCLEAR POWER TRAINING UNIT AND ANOTHER COMMISSIONED OFFICER WILL BE THE BOARD MEMBERS. IF A STUDENT FAILS HIS SECOND BOARD, HE WILL USUALLY BE DISENROLLED. IN SOME CASES I MAY APPROVE A THIRD BOARD.

THE ORAL BOARDS ARE CONDUCTED FORMALLY. THERE IS A CHAIRMAN OF THE BOARD. THE BOARD EXAMINES THE STUDENT'S RECORD. EACH MEMBER ASK QUESTIONS. ALL MEMBERS GRADE THE ANSWER. THE QUESTIONING CONTINUES UNTIL ALL ARE SATISFIED. FOR AN OFFICER, THIS USUALLY TAKES TWO TO THREE HOURS.

PROTOTYPE PROFICIENCY PHASE

ONCE HE HAS QUALIFIED, THE STUDENT ENTERS THE FOURTH AND LAST PHASE OF TRAINING AT THE PROTOTYPE. THIS IS THE PROFICIENCY PHASE. THE PRIMARY PURPOSE OF THIS PHASE IS TO

BECOME PROFICIENT AS A WATCHSTANDER. IN THIS PHASE THE STUDENT GETS WATCHSTANDING EXPERIENCE AS THE MAN ON WATCH AT THE STATION. HE TAKES THE WATCH BY HIMSELF, AND THERE IS NO STAFF WATCH STANDER PRESENT TO HELP HIM.

LECTURES ARE ALSO SCHEDULED TO INCREASE THE STUDENT'S KNOWLEDGE IN VARIOUS AREAS. IN ADDITION THE QUALIFIED STUDENT HAS AN OPPORTUNITY TO PARTICIPATE IN VARIOUS MAINTENANCE TASKS.

FOR THIS PART OF THE PROGRAM, THE LECTURES AND TASKS ARE SCHEDULED ON A CASE BASIS. THE OBJECT IS TO GIVE STUDENTS AS MUCH ADDITIONAL TRAINING AS WE CAN WHILE HE IS GAINING WATCHSTANDING EXPERIENCE. OBVIOUSLY, NOT ALL STUDENTS GET THE SAME AMOUNT OF PROFICIENCY TRAINING, SINCE THEY QUALIFY AT DIFFERENT TIMES.

THE ENTIRE CLASS GRADUATES AT THE SAME TIME AND ARE TRANSFERRED TO THE FLEET. A SMALL NUMBER OF THOSE WHO HAVE DEMONSTRATED ABOVE AVERAGE PERFORMANCE AT THE NUCLEAR POWER SCHOOL AND THE PROTOTYPE ARE RETAINED ON THE STAFF TO QUALIFY AS INSTRUCTORS.

I HAVE DESCRIBED THE PATH A STUDENT TAKES TO COMPLETE HIS PROTOTYPE QUALIFICATIONS. THERE ARE SOME OTHER AREAS RELATED TO THE PROTOTYPE AND THE TRAINING THERE THAT I WILL DISCUSS.

CONTROL OF THE PROTOTYPE TRAINING PROGRAM

THE PRIMARY CONTROL OF PROTOTYPE TRAINING PROGRAM IS THE PROTOTYPE TRAINING MANUAL. BOTH BETTIS AND KAPL LABORATORIES PARTICIPATED IN PREPARATION OF THIS DOCUMENT BEFORE NAVAL REACTORS APPROVED AND ISSUED IT. THIS ADMINISTRATIVE MANUAL COVERS ALL THE BASIC REQUIREMENTS FOR RUNNING THE PROGRAM. IT RANGES FROM THE ORGANIZATION AND TITLES OF PEOPLE INVOLVED, TO DETAILED DESCRIPTIONS OF HOW THE PROGRAM IS CONDUCTED. IT COVERS PREPARATION AND CONTROL OF ALL THE MATERIALS USED; INCLUDING, FOR EXAMPLE, WHAT MUST BE IN A LESSON PLAN, HOW IT IS ORGANIZED, WHO APPROVES IT, AND SO ON. IT COVERS THE PRIMARY ACADEMIC STANDARDS AND POLICIES.

BASED ON THE NAVAL REACTORS PROTOTYPE TRAINING MANUAL, APPROVED LOCAL PROTOTYPE TRAINING MANUALS HAVE BEEN DEVELOPED FOR EACH PROTOTYPE SITE. THIS ALLOWS SOME FLEXIBILITY TO TAKE ACCOUNT OF SITE DIFFERENCES. HOWEVER, ANY SIGNIFICANT DEVIATION REQUIRES THE APPROVAL OF NAVAL REACTORS.

STUDENT RECORDS

AS IN THE CASE OF THE NUCLEAR POWER SCHOOL, COMPLETE AND DETAILED RECORDS ARE KEPT ON EACH STUDENT FOR ALL OF HIS WORK AT THE PROTOTYPES. SAMPLE EXAMINATIONS USED FOR QUALIFICATION, HIS QUALIFICATION STANDARD, RESULTS OF ORAL EXAMINATIONS, AND

HIS COUNSELLING RECORDS, ARE ALL MAINTAINED FOR FIVE YEARS WHILE A SUMMARY OF HIS RECORD IS MAINTAINED FOR 20 YEARS. AS AN EXAMPLE, OF THE RECORDS MAINTAINED, EACH STUDENT MUST OBTAIN SOME ONE THOUSAND INSTRUCTOR SIGNATURES ATTESTING TO BEING WATCHSTATION QUALIFICATION THROUGHOUT HIS SIX MONTHS TRAINING AT THE PROTOTYPE. THESE RECORDS ARE RETAINED FOR FIVE YEARS AS PART OF THE STUDENT'S RECORD.

QUALIFICATION GUIDES

I HAVE DISCUSSED QUALIFICATION STANDARDS, WHICH ARE LOCAL DOCUMENTS ISSUED BY EACH PROTOTYPE PLANT. THESE STANDARDS ARE BASED UPON QUALIFICATION GUIDES WHICH ARE ALSO APPROVED BY NAVAL REACTORS FOR USE AT ALL PROTOTYPES. THE LOCAL STANDARD IS EXACTLY THE SAME AS THE NAVAL REACTORS GUIDES EXCEPT FOR DEVIATIONS TO ALLOW FOR A GIVEN PLANT'S DESIGN DIFFERENCES. ANY DEVIATIONS FROM THE NAVAL REACTORS ISSUED GUIDE REQUIRES NAVAL REACTORS APPROVAL.

PROTOTYPE ORGANIZATION

THE PROTOTYPE SITES ARE OPERATED BY A CONTRACTOR SITE MANAGER, AND THE INDIVIDUAL PROTOTYPE PLANTS ARE SUPERVISED BY A CONTRACTOR PLANT MANAGER. HE HAS TRAINING, MAINTENANCE, AND ADMINISTRATIVE GROUPS UNDER HIM THAT OPERATE AND MAINTAIN THE PLANTS, AND TRAIN THE STUDENTS. THESE GROUPS ARE A MIXTURE OF

CIVILIAN AND NAVY PERSONNEL. THE WINDSOR, CONNECTICUT SITE IS SLIGHTLY DIFFERENT IN THAT THERE IS NO CIVILIAN PLANT MANAGER. THE PROTOTYPE IS OPERATED BY THE NAVY WITH A NAVAL OFFICER IN CHARGE WHO HAS HAD COMMAND OF A NUCLEAR SHIP.

AS I HAVE MENTIONED, THE PROTOTYPE PLANTS ARE OPERATED ON A FOUR CREW BASIS AROUND THE CLOCK. BOTH NAVY AND CONTRACTOR PERSONNEL ARE ASSIGNED TO CREW AND STAFF WATCHES. THE CONTRACTOR SHIFT SUPERVISOR ON EACH CREW IS THE ON-SHIFT SENIOR CONTRACTOR WATCH, AND SUPERVISES OVERALL OPERATION OF THE PLANT. AGAIN, THE WINDSOR ORGANIZATION HAS A NAVAL OFFICER IN A SIMILAR CAPACITY.

I HAVE MENTIONED THE NUCLEAR POWER TRAINING UNIT (NPTU). THIS IS THE NAVY MILITARY ORGANIZATION AT EACH PROTOTYPE SITE THAT MILITARILY CONTROLS THE NAVAL PERSONNEL. THE COMMANDING OFFICER OF THE NPTU HAS PREVIOUSLY SERVED AS THE COMMANDING OFFICER OF A NUCLEAR POWERED SHIP. HE IS RESPONSIBLE FOR THE MILITARY PERFORMANCE OF THE NAVY PERSONNEL AT THE SITE. HE IS ALSO RESPONSIBLE TO ME TO SEE THAT TRAINING IS BEING PROPERLY CONDUCTED.

IN THE CASE OF THE WINDSOR PROTOTYPE, THE COMMANDING OFFICER, NPTU IS ALSO COMMANDING OFFICER OF THE PROTOTYPE FOR OPERATING THE PLANT. A CONTRACTOR ORGANIZATION IS THERE WITH A SITE MANAGER, BUT THE CIVILIAN ORGANIZATION DOES NOT OPERATE THE PLANT. BOTH THE COMMANDING OFFICER OF EACH NPTU AND HIS

EXECUTIVE OFFICER MONITOR THE PLANT, ACT AS MEMBERS OF VARIOUS QUALIFICATION BOARDS, AND CONDUCT WATCHSTANDING EVALUATIONS OF OFFICERS.

NAVY PROTOTYPE STAFF PERSONNEL

THE SELECTION OF NAVAL OFFICERS FOR ASSIGNMENT TO THE PROTOTYPE STAFF IS MADE BY THE CHIEF OF NAVAL PERSONNEL WITH THE ASSISTANCE OF MY STAFF AT NAVAL REACTORS. BECAUSE OF THE OPERATIONAL NATURE OF THEIR ASSIGNMENT AT THE PROTOTYPE, HEAVY WEIGHT IN SELECTION IS GIVEN TO THE OFFICER'S PERFORMANCE IN THE FLEET. THE OFFICER SHOULD HAVE STOOD IN THE UPPER FIFTY PERCENT OF HIS NUCLEAR POWER SCHOOL AND PROTOTYPE CLASSES. AN EXCEPTION TO THIS IS SOMETIMES MADE BASED ON ABOVE AVERAGE PERFORMANCE IN ATTAINING ENGINEER OFFICER QUALIFICATION AS WELL AS OUTSTANDING FLEET PERFORMANCE. SIMILAR CRITERIA ARE APPLIED TO SELECTION OF ENLISTED STAFF INSTRUCTORS. WE ALSO PLACE HEAVY WEIGHT ON THEIR DEMONSTRATED PERFORMANCE ON A NUCLEAR SHIP.

INSTRUCTOR TRAINING

WE HAVE ESTABLISHED AN EXTENSIVE INSTRUCTOR TRAINING PROGRAM. EACH INSTRUCTOR FIRST COMPLETES WATCH QUALIFICATION THEN HE IS TRAINED AS AN INSTRUCTOR OVER A SIX WEEK PERIOD AFTER QUALIFICATION.

HE MUST SPECIFICALLY QUALIFY FOR EACH TYPE OF TRAINING HE WILL BE INVOLVED IN, WHETHER IT IS PRESENTING CLASSROOM LECTURES, CONDUCTING SYSTEMS CHECKOUTS, PROVIDING WATCHSTANDING TRAINING, OR PARTICIPATING AS AN ORAL BOARD MEMBER. THE RECORD OF HIS QUALIFICATION IS DOCUMENTED IN A QUALIFICATION STANDARD.

TO CONTROL QUALITY, THE STAFF PERSONEL ARE PERIODICALLY EVALUATED BY A TRAINING OFFICER OR A CONTRACTOR MANAGER.

THE BEST STAFF INSTRUCTORS ARE EVENTUALLY ASSIGNED AS CLASSROOM INSTRUCTORS. THEY QUALIFY BY GIVING "DRY RUN" LECTURES TO SENIOR PERSONNEL. THE FIRST TIME THEY GIVE THE CLASSROOM LECTURE, THEY ARE MONITORED 100% OF THE TIME AND ARE CRITIQUED BY SENIOR INSTRUCTORS OR MANAGEMENT PERSONNEL. THE CIVILIAN CONTRACTOR PERSONNEL WHO ARE INVOLVED IN THE OPERATION OF THE PLANT QUALIFY TO THE SAME STANDARDS AS OFFICERS. THEY ALSO MUST GO THROUGH A TRAINING PROGRAM IN ORDER TO BECOME INSTRUCTORS.

MONITORING AND AUDITS

AN EXTENSIVE AUDIT AND MONITORING PROGRAM HAS BEEN SET UP TO CONFIRM THAT THE PROGRAM IS RUN THE WAY THE GOVERNMENT AND THE CONTRACTOR WANT IT TO BE RUN.

THIS INVOLVES ROUTINE AND SPECIAL AUDITS BY CONTRACTOR MANAGEMENT, BY THE NAVAL REACTORS FIELD OFFICE, AND BY THE NAVY NUCLEAR POWER TRAINING UNIT. IN SOME CASES THE AUDITORS STAND WATCHES FOR EXTENDED PERIODS OF TIME IN-HULL OR IN TRAINING AREAS TO LEARN WHAT IS GOING ON IN DEPTH.

IN ADDITION, A SEPARATE GROUP OF SEA-EXPERIENCED NAVAL OFFICERS, CALLED THE PLANT PERFORMANCE EVALUATION ACTIVITY (PPEA), WHOSE DAILY JOB IS TO DO IN-DEPTH EVALUATIONS OF OPERATIONS AND TRAINING AT EACH PROTOTYPE.

FINALLY THERE ARE PERIODIC AUDITS BY THE CONTRACTOR LABORATORIES AND BY NAVAL REACTORS HEADQUARTERS PERSONNEL.

I REQUIRE MY NAVAL REACTORS FIELD OFFICE PERSONNEL, CERTAIN CIVILIAN CONTRACTOR MANAGERS, PLANT PERFORMANCE EVALUATION ACTIVITY PERSONNEL, AND THE SENIOR NAVAL OFFICER ASSIGNED TO THE PROTOTYPES TO WRITE ME WEEKLY AND ADVISE ME OF PROBLEMS THEY HAVE OBSERVED IN ANY AREA, AND WHAT CORRECTIVE ACTION IS BEING TAKEN. MANY OF THESE LETTERS ADDRESS TRAINING ISSUES AND PROVIDE ME A GOOD INSIGHT AS TO HOW TRAINING IS BEING CONDUCTED. MEMBERS OF MY STAFF AT NAVAL REACTORS IN WASHINGTON PERIODICALLY VISIT THE NUCLEAR POWER SCHOOL AND THE PROTOTYPES AND REPORT TO ME, IN WRITING, THEIR OBSERVATIONS IN ALL AREAS INCLUDING THE TRAINING PROGRAM.

There is assigned, at each Naval Reactors field office, a sea-experienced nuclear trained officer whose primary function is to review all aspects of the training program at that site. He conducts frequent and detailed audits. He also reports in writing to me each week.

As is evidenced from what I have said, during the periods of formal academic instruction at Nuclear Power School and Prototype training, a process of weeding out those personnel not suitable to become nuclear plant operators takes place. Only those officers and enlisted men who have demonstrated that they have the academic and practical abilities required of a safe and competent operator are graduated from the training program. I consider this process essential to insure that only those who have proved themselves to be safe and competent operators are assigned to nuclear-powered ships. In this way I attempt to maintain uniform high standards throughout the program. You should note that, even with the careful selection of personnel I have described, and a training program that involves a significant amount of counseling, the academic failure rate over the one year course is about twelve per cent for officers and about twenty per cent for enlisted personnel.

Once the officer or enlisted man has satisfactorily completed Nuclear Power School and prototype training he is considered to be "nuclear qualified". In the case of an officer, he is

ASSIGNED A NUCLEAR DESIGNATOR CODE WHICH IDENTIFIES HIM AS HAVING QUALIFIED FOR ASSIGNMENT TO JOBS INVOLVING THE SUPERVISION, OPERATION AND MAINTENANCE OF A NAVAL NUCLEAR PROPULSION PLANT. ENLISTED PERSONNEL RECEIVE A NAVY ENLISTED CLASSIFICATION CODE (NEC) WHICH LIKEWISE IDENTIFIES THE INDIVIDUAL AS BEING ASSIGNABLE TO A NUCLEAR BILLET. THESE DESIGNATOR CODES ARE IMMEDIATELY REMOVED IF THE INDIVIDUAL BECOMES UNASSIGNABLE TO A NUCLEAR JOB BECAUSE OF POOR PERFORMANCE, UNRELIABILITY, OR FOR OTHER CAUSES.

THESE NUCLEAR DESIGNATORS, BOTH FOR OFFICER AND ENLISTED PERSONNEL, ARE ASSIGNED BY THE CHIEF OF NAVAL PERSONNEL BASED ON NAVAL REACTORS RECOMMENDATION. REMOVAL OF AN OFFICERS NUCLEAR DESIGNATOR CAN ONLY BE DONE WITH MY APPROVAL. REMOVAL OF ENLISTED NUCLEAR DESIGNATION REQUIRES NAVAL REACTORS CONCURRENCE.

FLEET NUCLEAR PROPULSION PLANT TRAINING

ALL PERSONNEL WHO OPERATE ANY EQUIPMENT DIRECTLY ASSOCIATED WITH THE NUCLEAR PROPULSION PLANT ABOARD SHIP MUST HAVE RECEIVED THE ONE YEAR COURSE, INCLUDING THE FORMAL ACADEMIC TRAINING AND THE OPERATIONAL TRAINING AT ONE OF THE PROTOTYPES. THIS REQUIREMENT IS EXPLICITLY STATED IN THE NAVY'S INSTRUCTION ON OPERATION OF NUCLEAR-POWERED SHIPS. THIS STATES

THAT KEY PROPULSION PLANT WATCHES MAY BE STOOD ONLY BY GRADUATES OF THIS ONE YEAR COMBINED COURSE. THIS REQUIREMENT INSURES THAT ALL NUCLEAR PROPULSION PLANT OPERATORS HAVE RECEIVED TRAINING SUPERVISED BY THE DEPARTMENT OF ENERGY, AND ARE FAMILIAR WITH THE THEORETICAL AND PRACTICAL ASPECTS OF SAFE REACTOR OPERATION.

FOLLOWING COMPLETION OF TRAINING AT A PROTOTYPE, THE NEWLY QUALIFIED OFFICER OR ENLISTED PERSONNEL IS ASSIGNED TO BILLETS IN NUCLEAR-POWERED SHIPS. THEY THEN LEARN THE SYSTEMS AND PROCEDURES PERTAINING TO THEIR PARTICULAR SHIP. THE ENLISTED PERSONNEL COMPLETE QUALIFICATION ON ALL WATCH STATIONS PERTINENT TO THEIR RATING, AND THE OFFICERS QUALIFY AS ENGINEERING OFFICERS OF THE WATCH ON THE NUCLEAR PROPULSION PLANT OF THAT SHIP. THE QUALIFICATION PROGRAM IN EACH SHIP IS ACTUALLY A CONTINUOUS TRAINING AND RETRAINING PROCESS. I WILL NOW DESCRIBE HOW THIS FLEET NUCLEAR PROPULSION PLANT TRAINING IS CONDUCTED.

SHIPBOARD QUALIFICATION

OFFICER AND ENLISTED PERSONNEL REPORTING TO THE FLEET ARRIVE WITH A SOLID BACKGROUND IN THE PRINCIPLES OF OPERATION OF A NUCLEAR PROPULSION PLANT. THEY HAVE ALSO LEARNED "HOW TO QUALIFY." THE SHIPBOARD QUALIFICATION PROGRAM CONSISTS OF BASIC ENGINEERING QUALIFICATION (BEQ) AND INDIVIDUAL WATCHSTATION QUALIFICATION. BASIC ENGINEERING QUALIFICATION PROVIDES A CROSS

RATE BACKGROUND LEVEL OF KNOWLEDGE FOR ALL NUCLEAR TRAINED PERSONNEL, AND ALLOWS THE OPERATOR TO BUILD ON THE PRINCIPLES LEARNED AT THE NUCLEAR POWER SCHOOL AND THE PROTOTYPE. THIS QUALIFICATION CONSISTS OF VARIOUS NUCLEAR PROPULSION PLANT KNOWLEDGE REQUIREMENTS INCLUDING SUBJECTS SUCH AS REACTOR THEORY, SYSTEMS DESIGN, PRINCIPLES OF OPERATING AND CASUALTY PROCEDURES, ENGINEERING DEPARTMENT ORGANIZATION, RADIOLOGICAL CONTROLS AND CHEMISTRY. IN MOST CASES BEQ WILL BE PURSUED CONCURRENTLY WITH INITIAL WATCH QUALIFICATION AND SOME PORTIONS ARE PREREQUISITES FOR EACH WATCHSTATION. ADVANCED WATCH QUALIFICATIONS SUCH AS REACTOR OPERATOR REQUIRE COMPLETION OF BEQ IN ITS ENTIRETY.

THE SHIPBOARD PROGRAM OF WATCH QUALIFICATION FOR OFFICER AND ENLISTED PERSONNEL VARIES FROM THAT AT THE PROTOTYPE IN THAT IT IS LESS RIGIDLY STRUCTURED. THE INDIVIDUAL IS EXPECTED TO COMPLETE PRACTICAL FACTORS AND TRAINING WATCH REQUIREMENTS CONCURRENT WITH STUDY AND CHECKOUT ON SHIPBOARD PROPULSION PLANT SYSTEMS. SINCE HE HAS JUST COMPLETED PROTOTYPE QUALIFICATION THIS IS NOT AN UNREASONABLE EXPECTATION.

EACH OFFICER, UPON REPORTING TO HIS FIRST NUCLEAR SHIP, MUST QUALIFY AS ENGINEERING OFFICER OF THE WATCH (EOOW). HE COMPLETES BASIC ENGINEERING QUALIFICATION AND SELECTED THEORETICAL AND PRACTICAL PORTIONS OF ENLISTED WATCH STANDER

QUALIFICATION REQUIREMENTS AS PREREQUISITES TO THE ADVANCED REQUIREMENTS FOR EOOW. IT USUALLY TAKES THREE TO SIX MONTHS TO COMPLETE THIS QUALIFICATION DEPENDING ON THE ABILITY OF THE OFFICER, THE SHIP'S OPERATING SCHEDULE AND THE SIMILARITY OF THE SHIPBOARD PLANT WITH THAT OF THE PROTOTYPE THE OFFICER ATTENDED.

THE FIRST STEP IN SHIPBOARD QUALIFICATION FOR AN ENLISTED OPERATOR IS TO QUALIFY RAPIDLY ON AN IN-RATE WATCHSTATION SO THAT HE MAY BECOME A USEFUL MEMBER OF THE CREW. THE LENGTH OF TIME REQUIRED WILL VARY DEPENDING ON THE WATCHSTATION, AND THE ADDITIONAL FACTORS PREVIOUSLY MENTIONED AS AFFECTING OFFICER QUALIFICATION RATE. FOR EXAMPLE, AN ENGINEERING LABORATORY TECHNICIAN (ELT) MAY BE ABLE TO QUALIFY AS A SHIPBOARD ELT IN ONLY A FEW DAYS BECAUSE SHIPBOARD RADIOLOGICAL CONTROLS AND CHEMISTRY EQUIPMENT, PROCEDURES, AND ASSOCIATED SYSTEMS ARE VERY SIMILAR TO THOSE AT ALL PROTOTYPES. BUT IT WILL USUALLY TAKE SEVERAL WEEKS OR MONTHS FOR HIM TO QUALIFY AT OTHER WATCHSTATIONS.

THE SUBMARINE AND SURFACE SHIP FORCE COMMANDERS HAVE PROMULGATED RECOMMENDED QUALIFICATION PATHS FOR EACH RATE AND HAVE PROVIDED GUIDELINES INDICATING THE APPROXIMATE LENGTH OF TIME THE AVERAGE INDIVIDUAL IS EXPECTED TO COMPLETE EACH WATCH QUALIFICATION. EXPERIENCE HAS SHOWN THAT MANY OPERATORS WILL QUALIFY IN LESS TIME THAN THE GUIDELINE PERIOD WHILE A

FEW WILL EXCEED IT. ULTIMATELY EACH ENLISTED MAN IS REQUIRED TO QUALIFY ON HIS MOST ADVANCED IN-RATE WATCHSTATION AND, UPON GAINING APPROPRIATE SENIORITY AND EXPERIENCE, TO QUALIFY AS ENGINEERING WATCH SUPERVISOR (EWS), THE MOST SENIOR ENLISTED WATCH.

PREVIOUSLY QUALIFIED PERSONNEL, OFFICER AND ENLISTED, RETURNING FROM SHORE DUTY OR TRANSFERRING FROM ANOTHER SHIP WILL BE EXAMINED ON THE SENIOR WATCHSTATION ON WHICH THEY WERE PREVIOUSLY QUALIFIED. THE RESULTS OF THIS EXAMINATION WILL DETERMINE THE TYPE AND LENGTH OF QUALIFICATION REQUIRED FOR REQUALIFICATION IN THEIR NEW SHIP.

THE MECHANICS OF SHIPBOARD WATCH QUALIFICATION ARE SIMILAR TO THOSE ALREADY DESCRIBED AND IN USE AT THE PROTOTYPES. THE OPERATOR MUST STUDY THE SYSTEM OR OTHER SUBJECT, PHYSICALLY TRACE OUT THE SYSTEM, LOCATE COMPONENTS AND, FINALLY, RECEIVE A CHECKOUT WITH SATISFACTORY KNOWLEDGE LEVEL INDICATED BY A SIGNATURE ON HIS QUALIFICATION CARD WHICH IS SIMILAR IN PURPOSE TO THE PROTOTYPE QUALIFICATION STANDARD. HE MUST COMPLETE PRACTICAL FACTORS AND DEMONSTRATE SATISFACTORY ABILITY TO HANDLE HIS WATCHSTATION DURING TRAINING WATCHES. FINAL COMPREHENSIVE ORAL AND WRITTEN EXAMINATIONS COMPLETE THIS QUALIFICATION PROCESS.

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QUALIFICATION QUALITY CONTROL

TO ASSURE SAFE AND RELIABLE PROPULSION PLANT OPERATION, I HAVE, THROUGH THE CHIEF OF NAVAL OPERATIONS, ESTABLISHED HIGH STANDARDS AND REQUIRE THAT THESE STANDARDS BE MAINTAINED WITHIN THE SHIPBOARD QUALIFICATION PROGRAM. THE STANDARDS THAT ARE TO BE OBSERVED ARE SPELLED OUT IN THE ENGINEERING DEPARTMENT MANUAL FOR NAVAL NUCLEAR PROPULSION PLANTS, AND IN QUALIFICATION GUIDES FOR NUCLEAR PROPULSION PLANT WATCHSTANDERS. THESE PUBLICATIONS ARE PREPARED BY NAVAL REACTORS AND FORM THE BASIS FOR DEVELOPMENT OF SHIPBOARD QUALIFICATION REQUIREMENTS. QUALITY CONTROL OF THE QUALIFICATION PROGRAM IS MAINTAINED BY FORMALLY STATED REQUIREMENTS. PERSONNEL WHO ARE AUTHORIZED TO CERTIFY COMPLETION OF THE VARIOUS QUALIFICATION REQUIREMENTS ARE DESIGNATED IN WRITING AND MUST DEMONSTRATE THAT THEY POSSESS THE REQUISITE KNOWLEDGE LEVEL TO BE A QUALIFICATION PETTY OFFICER. THE ENGINEERING DEPARTMENT MANUAL DEFINES WHO MAY APPROVE THE WRITTEN EXAMINATIONS TO BE GIVEN FOR EACH WATCHSTATION AND ALSO SPECIFIES WHO HAS THE AUTHORITY TO CERTIFY FINAL QUALIFICATION. FOR EXAMPLE, THE COMMANDING OFFICER IS PERSONALLY REQUIRED TO CERTIFY THE FINAL QUALIFICATION OF ALL REACTOR OPERATORS, AS WELL AS CERTAIN OTHER WATCHSTANDERS. THE END PRODUCT OF THE SYSTEM I HAVE DESCRIBED IS A TRAINED NUCLEAR PROPULSION PLANT WATCHSTANDER WHO UNDERSTANDS HOW THE PLANT WORKS, WHY IT WORKS AND WHAT IS REQUIRED FOR SAFE OPERATION.

CONTINUING TRAINING PROGRAM

SHIPBOARD NUCLEAR PROPULSION PLANT TRAINING IS NOT LIMITED TO THE WATCH QUALIFICATION PROGRAM. A CONTINUOUS SHIPBOARD TRAINING PROGRAM IS A HIGH PRIORITY PROGRAM CONSISTING OF MAINTENANCE OF WATCHSTANDING PROFICIENCY, WATCHSTANDER REQUALIFICATION, AND WHAT I WILL CALL "RECURRING TRAINING."

MAINTENANCE OF WATCHSTANDING PROFICIENCY

AN OPERATOR CAN BE CONSIDERED PROFICIENT ON A GIVEN WATCHSTATION ONLY IF HE STANDS WATCH AT A PRESCRIBED FREQUENCY ON THAT WATCHSTATION. IN THE NAVAL NUCLEAR PROGRAM WE DEFINE THIS REQUIREMENT AND MAINTAIN RECORDS SO THAT WE CAN BE SURE WHEN WE ASSIGN AN OPERATOR TO A WATCH STATION THAT HE HAS "MAINTAINED HIS PROFICIENCY" ON THAT WATCHSTATION. FOR EXAMPLE, I REQUIRE AN ENGINEERING OFFICER OF THE WATCH TO STAND AT LEAST TWO-FOUR HOUR WATCHES EACH MONTH TO MAINTAIN PROFICIENCY. IF A WATCHSTANDER DOES NOT MEET THESE REQUIREMENTS HIS NAME IS REMOVED FROM THE LIST OF QUALIFIED WATCHSTANDERS AND HE IS REQUIRED TO COMPLETE SPECIAL TRAINING SPECIFIED BY THE SHIP'S ENGINEER OFFICER BEFORE HE CAN BE RETURNED TO THE LIST OF QUALIFIED WATCHSTANDERS.

WATCHSTANDER REQUALIFICATION PROGRAM

THE WATCHSTANDER REQUALIFICATION PROGRAM TAKES INTO ACCOUNT: (1) THE OPERATOR WHO HAS FAILED TO MAINTAIN OR RE-ESTABLISH WATCHSTANDING PROFICIENCY FOR MORE THAN SIX MONTHS;

(2) THE NEED TO PERIODICALLY REESTABLISH A MINIMUM LEVEL OF WATCHSTANDER KNOWLEDGE SINCE, REGARDLESS OF HOW OFTEN THE OPERATOR STANDS WATCH, HIS KNOWLEDGE LEVEL DEGRADES WITH TIME AND (3) THE NEED TO REQUALIFY PERSONNEL WHEN NEW EQUIPMENT IS ADDED OR ALTERATIONS MADE TO INSTALLED EQUIPMENT. THIS PROGRAM REQUIRES THE COMPLETE REQUALIFICATION OF ANY WATCHSTANDER WHO HAS NOT STOOD A PARTICULAR WATCH FOR OVER SIX MONTHS. IT REQUIRES THE COMPLETE REQUALIFICATION OF ALL WATCHSTANDERS EVERY TWO YEARS REGARDLESS OF HOW OFTEN THEY STAND WATCH.

WHEN NEW EQUIPMENT IS ADDED, OR INSTALLED EQUIPMENT ALTERED, THE COMMANDING OFFICER AND ENGINEER OFFICER DETERMINE TO WHAT EXTENT REQUALIFICATION IS REQUIRED. ALL WATCHSTANDERS ARE ALSO REQUIRED TO REQUALIFY ON SHIPS UNDERGOING OVERHAUL. THIS PROVISION ENSURES THAT WATCHSTANDERS WHO MAY NOT HAVE STOOD A WATCH ON AN OPERATING PROPULSION PLANT FOR SEVERAL MONTHS OR A LONGER PERIOD ARE REQUALIFIED ON THOSE WATCHSTATIONS BEFORE THE PLANT IS AGAIN OPERATED. THIS NOT ONLY UPGRADES WATCHSTANDING BUT ENSURES ADEQUACY OF TRAINING ON EQUIPMENT NEW TO THE WATCHSTANDER.

RECURRING TRAINING

A MAJOR PORTION OF TRAINING TIME IS SPENT ON "RECURRING TRAINING". THERE IS A CONTINUING NEED TO REINFORCE INITIAL TRAINING AND PROVIDE TRAINING WHICH INCREASES THE LEVEL OF KNOWLEDGE OF ALL NUCLEAR OPERATORS. I WANT TO MAKE IT CLEAR THAT, IN ORDER TO MAINTAIN HIGH STANDARDS IN THE NAVY NUCLEAR PROPULSION PROGRAM, SHIPS COMMANDING OFFICERS MUST CONDUCT RECURRING TRAINING. THIS TRAINING IS ALSO A VEHICLE FOR IMPROVING THE WATCHSTANDER'S ABILITY TO HANDLE CASUALTIES, AND SUPPORTS MORE ADVANCED WATCH QUALIFICATION.

THE METHODS USED IN CONDUCTING NUCLEAR PROPULSION PLANT RECURRING TRAINING IN SHIPS ARE THE SAME PROVEN WAYS OF ACCOMPLISHING TRAINING I HAVE DESCRIBED AND ARE IN USE AT NUCLEAR POWER SCHOOL AND PROTOTYPES. LECTURES AND SEMINARS ARE CONDUCTED ON A DEPARTMENTAL AND DIVISIONAL BASIS. IN MOST CASES A MONITOR, SENIOR TO THE INSTRUCTOR OR SEMINAR LEADER IS PRESENT TO ASSIST IN KEEPING THE TRAINING SESSION "ON TRACK", AND TO PROVIDE FEEDBACK TO THE COMMAND AND THE INSTRUCTOR ON THE QUALITY OF THE LECTURE OR SEMINAR. LECTURES ARE GIVEN BY EXPERIENCED PERSONNEL WHO ARE SPECIFICALLY SELECTED TO FIT THE TOPIC AND AUDIENCE. SELECTION OF INSTRUCTORS, LECTURERS AND MONITORS IS AN IMPORTANT QUALITY CONTROL MEASURE.

A COMPREHENSIVE EXAMINATION PROGRAM IS A KEY FACTOR IN ANY FORMAL TRAINING PROGRAM. EXAMINATIONS ARE NECESSARY TO ENSURE

UNDERSTANDING AND RETENTION OF THE MATERIAL COVERED IN LECTURES AND SEMINARS. THEREFORE, EXAMINATIONS ARE GIVEN COVERING MOST "RECURRING TRAINING" SESSIONS AND ARE DESIGNED TO BE TOUGH ENOUGH TO CHALLENGE THE MOST KNOWLEDGEABLE CREW MEMBERS.

CASUALTY DRILL TRAINING

IN ADDITION TO CLASSROOM TYPE TRAINING, THE RECURRING TRAINING PROGRAM IS ALSO COMPOSED OF PRACTICAL EVOLUTIONS AND CASUALTY DRILLS. THESE FORM AN IMPORTANT PART OF THE SHIPBOARD TRAINING PLAN, ALLOWING THE NUCLEAR PROPULSION PLANT OPERATOR TO BUILD ON HIS THEORETICAL KNOWLEDGE OF THE PROPULSION PLANT AND PUT INTO PRACTICE THE PRINCIPLES OF OPERATING AND CASUALTY PROCEDURES HE HAS STUDIED. THE ENGINEERING DEPARTMENT MANUAL FOR NAVAL NUCLEAR PROPULSION PLANTS LISTS THE REQUIRED DRILLS AND EVOLUTIONS AND INDICATES WHETHER THE DRILL SHOULD BE WALKED-THROUGH OR ACTUALLY CONDUCTED. IN SOME CASES, PART OF THE CASUALTY ACTION MAY BE WALKED-THROUGH AND PART ACTUALLY CARRIED OUT. WITHIN THE CONSTRAINTS OF REACTOR AND SHIP SAFETY, A CONSCIOUS EFFORT IS MADE TO CARRY OUT THESE CASUALTY DRILLS IN A REALISTIC MANNER.

POORLY CONDUCTED CASUALTY DRILL TRAINING, WHICH ALLOWS IMPROPER ACTIONS TO OCCUR WITHOUT IDENTIFICATION AND CORRECTION, SIMPLY REINFORCES THE WRONG WAY TO DO THINGS IN THE PROPULSION PLANT. IN EFFECT, WE COULD TRAIN OURSELVES TO OPERATE THE PLANT IN AN UNSATISFACTORY FASHION. TO AVOID THIS I INSIST THAT CASUALTY DRILLS BE CAREFULLY PLANNED, CLOSELY MONITORED AND

THOROUGHLY CRITIQUED.

I WILL DESCRIBE SOME OF THE CONSIDERATIONS THAT ARE INVOLVED IN THE CONDUCT OF CASUALTY DRILLS ON A NUCLEAR SHIP. FIRST, A DRILL GUIDE IS PREPARED WHICH DESCRIBES THE DRILL, HOW IT WILL BE INITIATED, WHAT IS TO BE ACCOMPLISHED, SPECIFIES SAFETY MONITORS AND OBSERVERS, ETC. VARIOUS PROPULSION PLANT REFERENCE MATERIAL AND THE ENGINEERING DEPARTMENT MANUAL ARE USED. THE ENGINEER OFFICER THEN SUBMITS THIS DRILL GUIDE TO THE SHIP'S COMMANDING OFFICER FOR HIS APPROVAL. A FILE OF THESE APPROVED DRILL GUIDES IS MAINTAINED FOR RECURRING USE. THE COMMANDING OFFICER MUST APPROVE THE ACTUAL CONDUCT OF EACH DRILL EVEN THOUGH HE HAS PREVIOUSLY APPROVED THE BASIC DRILL GUIDE. SOMETIMES THE WATCH SECTION SCHEDULED FOR A PARTICULAR DRILL WILL BE NOTIFIED WELL IN ADVANCE OF THE NATURE OF THE DRILL IN ORDER THAT SPECIFIC TRAINING, SUCH AS A REVIEW OF THE APPROPRIATE CASUALTY PROCEDURES, MAY BE ACCOMPLISHED. THIS MAY BE APPROPRIATE WHERE THE SECTION WILL BE DOING A DIFFICULT DRILL FOR THE FIRST TIME OR WHERE THE SHIP HAS JUST COMPLETED A LENGTHLY PERIOD WITH THE PLANT SHUTDOWN.

DRILL MONITORS AND SAFETY OBSERVERS MUST BE FULLY AWARE OF WHAT IS EXPECTED OF THEM AND THE LIMITS TO THEIR RESPONSIBILITIES. THIS IS ACCOMPLISHED AT A BRIEFING ATTENDED BY ALL MONITORS AND SAFETY OBSERVERS AND NORMALLY LED BY THE ENGINEERING OFFICER. I CONSIDER IT APPROPRIATE THAT THE SHIP'S COMMANDING OFFICER OR EXECUTIVE OFFICER BE PRESENT AT THESE

BRIEFINGS TO THE MAXIMUM EXTENT POSSIBLE. AN IMPORTANT ASPECT OF THIS SESSION IS TO REVIEW IN DETAIL HOW THE DRILL WILL BE INITIATED AND HOW THE SYMPTOMS OF THE CASUALTY WILL BE MADE KNOWN TO THE WATCHSTANDERS IN CASES WHERE THE ENTIRE CASUALTY CANNOT BE ALLOWED TO OCCUR BECAUSE OF REACTOR OR SHIP SAFETY. REALISM IN THE CONDUCT OF CASUALTY DRILLS IS IMPORTANT, BUT SAFETY CONSIDERATIONS DICTATE THAT SOME CASUALTIES SHOULD NOT ACTUALLY BE DONE FOR TRAINING. THEREFORE, WE USE TECHNIQUES FOR PRESENTING THE SYMPTOMS OF THESE CASUALTIES IN A MANNER THAT WILL, AS NEARLY AS PRACTICABLE, APPEAL TO THE SAME SENSES THAT THE WATCHSTANDER WOULD NORMALLY USE IN THE CASUALTY SITUATION. DURING THIS PRE-DRILL BRIEFING THE APPLICABLE CASUALTY PROCEDURES ARE ALSO REVIEWED TO ENSURE THAT ALL MONITORS AND SAFETY OBSERVERS KNOW THE CORRECT WATCHSTANDER ACTIONS.

THE ACTUAL CASUALTY DRILL MAY BE PRE-ANNOUNCED OR MAY BE A SURPRISE TO THE WATCH SECTION. THE ENGINEER OFFICER WILL NORMALLY MAKE THIS DETERMINATION. SOME COMBINATION OF BOTH METHODS IS APPROPRIATE TO ENSURE THAT THE WATCHSTANDERS CAN PROPERLY HANDLE UNEXPECTED PLANT CASUALTIES. DURING DRILLS, MONITORS CORRECT WATCHSTANDER ERRORS ON THE SPOT, WHERE FAILURE TO DO SO WOULD REINFORCE IMPROPER ACTIONS. SAFETY MONITORS ARE STATIONED TO PREVENT INCORRECT WATCHSTANDER ACTION WHICH COULD HAZARD THE REACTOR PLANT. DRILLS ARE ALLOWED TO PROGRESS LONG ENOUGH TO EVALUATE THE SECTION'S ABILITY TO RESTORE THE PLANT TO ITS NORMAL CONDITION. OBVIOUSLY THERE ARE PRACTICAL LIMITS TO DRILL LENGTH AND IN SOME CASES THE FIRST WATCH SECTION WILL

CARRY OUT THE INITIAL CASUALTY ACTIONS AND A SECOND SECTION WILL RECOVER THE PLANT BACK TO A NORMAL CONDITION. UPON COMPLETION OF THE DRILL, A CRITIQUE INVOLVING ALL DRILL MONITORS IS IMMEDIATELY HELD TO COLLECT COMMENTS, DETERMINE WHERE ERRORS WERE MADE AND EVALUATE THE OVERALL CONDUCT OF THE DRILL. APPROPRIATE REFERENCE MATERIAL SUCH AS THE OPERATING MANUALS FOR THE SHIPS PROPULSION PLANT ARE ESSENTIAL AT THIS SESSION TO ACCURATELY ASSESS ALL OF THE CASUALTY ACTIONS TAKEN.

AFTER THE ENGINEER OFFICER HAS ASSEMBLED THE SIGNIFICANT COMMENTS FROM THE MONITOR CRITIQUE HE CONDUCTS A CRITIQUE OF THE DRILL FOR THE WATCH SECTION AFTER THEY COME OFF WATCH. IF TRAINING LESSONS ARE TO BE LEARNED THAT WOULD BENEFIT OTHER ENGINEERING DEPARTMENT PERSONNEL, THE ENGINEER OFFICER WILL CAUSE THIS INFORMATION TO BE DISSEMINATED. FINALLY, WHERE DRILL DEFICIENCIES SHOW WEAKNESSES IN THE SHIP'S FUNDAMENTAL TRAINING PROGRAM, CORRECTIVE MEASURES ARE TAKEN TO UPGRADE THESE AREAS. SIMILIAR REQUIREMENTS FOR MAINTAINING WATCHSTANDING PROFICIENCY AND CONDUCTING CONTINUING TRAINING ARE ALSO ESTABLISHED AT THE PROTOTYPE PLANTS FOR STAFF PERSONNEL.

TRAINING FOR NEW CONSTRUCTION NUCLEAR-POWERED SHIPS

TRAINING OF PERSONNEL ASSIGNED TO A NEW CONSTRUCTION NUCLEAR-POWERED SHIP BEGINS UPON ARRIVAL OF THE CREW AT THE SHIPYARD. THIS ARIVAL IS TIMED SO THAT THE MAJORITY OF THE ENGINEERING DEPARTMENT PERSONNEL ARE PRESENT FOR THE ENTIRE PROPULSION

PLANT TEST PROGRAM. TWO-THIRDS OF THE NUCLEAR-TRAINED PERSONNEL FOR THE NEW CREW ARE REQUIRED TO HAVE SERVED ON AN OPERATING NUCLEAR-POWERED SHIP AND BE QUALIFIED ON THE PROPULSION PLANT OF THAT SHIP. ENGINEERING PERSONNEL RECEIVE CLASSROOM LECTURES CONDUCTED BY THE EXPERIENCED SHIP'S ENGINEERING PERSONNEL, SHIPYARD PERSONNEL, AND MANUFACTURERS' REPRESENTATIVES. ALL PERSONNEL MUST COMPLETE INITIAL SHIPBOARD WATCHSTANDER QUALIFICATION OR REQUALIFY UNDER PROCEDURES SIMILAR TO THOSE FOR INITIAL QUALIFICATION, IN THE CASE OF OPERATORS WHO HAVE PREVIOUSLY QUALIFIED IN ANOTHER SHIP. THE CREW GAINS PRACTICAL OPERATING EXPERIENCE ABOARD SHIP BY PARTICIPATING DIRECTLY IN THE TESTING OF THE PROPULSION PLANT, BEGINNING WITH EXTENSIVE TESTS BEFORE THE REACTOR CORE IS INSTALLED. IN THE CASE OF CERTAIN NEW DESIGN SHIPS, SPECIAL SHORT COURSES FOR THE NEW CONSTRUCTION NUCLEUS CREWS ARE TAUGHT AT THE PROTOTYPE PLANT OR THE APPROPRIATE NAVAL REACTORS LABORATORY. THIS BETTER PREPARES THE NUCLEAR TRAINED PERSONNEL FOR OPERATION OF THE PROPULSION PLANT DURING THE INITIAL TEST PROGRAM. THE SHIP'S CREW OPERATES THE EQUIPMENT DURING THE TEST PROGRAM, UNDER THE SURVEILLANCE OF QUALIFIED ENGINEERS AND SCIENTISTS INCLUDING REPRESENTATIVES OF THE DEPARTMENT OF ENERGY. IN THIS WAY THE CREW BECOMES THOROUGHLY FAMILIAR WITH OPERATION AND MAINTENANCE OF THE PROPULSION PLANT, AND IS READY TO TAKE THE SHIP TO SEA ON ITS FIRST TRIALS WITH MAXIMUM ASSURANCE OF SAFE OPERATION.

TRAINING FOR NUCLEAR POWERED SHIPS UNDERGOING OVERHAUL

TRAINING OF NUCLEAR PROPULSION PLANT OPERATORS ON SHIPS UNDERGOING OVERHAUL IS ACCOMPLISHED USING THE SAME METHODS AS FOR OPERATING SHIPS. THERE ARE SOME MINOR DIFFERENCES IN THAT THERE IS LESS OPPORTUNITY FOR PRACTICAL TRAINING, AND SOME SPECIAL TRAINING SESSIONS MAY BE CONDUCTED BY CONTRACTOR OR SHIPYARD PERSONNEL. AS I HAVE MENTIONED, ALL WATCHSTANDERS MUST REQUALIFY UNDER PROCEDURES SIMILAR TO THOSE FOR INITIAL QUALIFICATION.

ENGINEER OFFICER TRAINING AND QUALIFICATION

IN ADDITION TO THE ONE YEAR COURSE OF INSTRUCTION AND SUBSEQUENT SHIPBOARD QUALIFICATION ALREADY DESCRIBED, THOSE OFFICERS WHO ARE ASSIGNED AS ENGINEER OFFICER OF NUCLEAR-POWERED SHIPS ARE FORMALLY EXAMINED AND QUALIFIED. EACH NUCLEAR TRAINED JUNIOR OFFICER IS EXPECTED TO COMPLETE THIS QUALIFICATION PRIOR TO THE END OF HIS FIRST OR, IN THE CASE OF SURFACE SHIP OFFICERS, SECOND SHIPBOARD TOUR OF DUTY. THIS PROGRAM INVOLVES PREPARATION BY THE CANDIDATE, ON BOARD HIS SHIP, AND FINAL APPROVAL BY ME AFTER HE SUCCESSFULLY COMPLETES A COMPREHENSIVE WRITTEN AND ORAL EXAMINATION ADMINISTERED OVER A TWO DAY PERIOD AT NAVAL REACTORS IN WASHINGTON.

THE TRAINING PROGRAM FOR THE PROSPECTIVE ENGINEER OFFICER IS AN INDIVIDUALLY ESTABLISHED STUDY PLAN FORMULATED UNDER THE SUPERVISION OF HIS COMMANDING OFFICER. FROM THE PRACTICAL

EXPERIENCE STANDPOINT THE CANDIDATE MUST HAVE TWO YEARS EXPERIENCE ONBOARD A NUCLEAR SHIP AND MUST HAVE BEEN AN ENGINEERING DEPARTMENT DIVISION OFFICER FOR AT LEAST ONE YEAR. HE MUST, OF COURSE, HAVE THE RECOMMENDATION OF HIS COMMANDING OFFICER. WHEN SO RECOMMENDED, THE CANDIDATE WILL BE ORDERED BY THE CHIEF OF NAVAL PERSONNEL TO REPORT TO NAVAL REACTORS FOR TWO DAYS TO BE EXAMINED FOR QUALIFICATION AS ENGINEER OFFICER. THE FIRST DAY THE OFFICER WILL TAKE A SEVEN AND ONE-HALF HOUR WRITTEN EXAMINATION CONSISTING OF FIVE SECTIONS COVERING REACTOR THEORY, RADIOLOGICAL CONTROLS AND CHEMISTRY, FLUID SYSTEMS, ELECTRICAL SYSTEMS AND OVERALL PLANT OPERATIONS. HE MUST PASS ALL SECTIONS OF THE EXAMINATION. ON THE SECOND DAY THE CANDIDATE RECEIVES THREE ORAL INTERVIEWS ON PROPULSION PLANT SUBJECTS. HE MUST PASS ALL THREE ORAL INTERVIEWS. IF HE SUCCESSFULLY PASSES ALL AREAS OF THE EXAMINATION HE WILL THEN BE DESIGNATED AS QUALIFIED TO SERVE AS ENGINEER OFFICER OF A NUCLEAR SHIP. IF HE FAILS EITHER THE WRITTEN OR ORAL EXAMINATION, ONE REEXAMINATION IS USUALLY ALLOWED. THE OFFICER IS REQUIRED TO COMPLETE BOTH AN ORAL AND WRITTEN REEXAMIANTION IN ALL AREAS REGARDLESS OF THE AREA OR AREAS HE FAILED. BEING SUCCESSFUL IN ATTAINING THE ENGINEER OFFICER QUALIFICATION DOES NOT GUARANTEE THAT THE INDIVIDUAL WILL SERVE AS ENGINEER OFFICER SINCE ONLY THE TECHNICALLY BEST PEOPLE ARE CHOSEN FOR THIS ASSIGNMENT. ALL OFFICERS NOW ASSIGNED AS ENGINEER OFFICER HAVE BEEN QUALIFIED UNDER THIS SYSTEM. WE HAVE ALSO REACHED THE POINT WHERE ALL NUCLEAR-TRAINED OFFICERS MUST PASS THIS ADDITIONAL QUALIFICATION REQUIREMENT IN ORDER TO BE ASSIGNED AS EXECUTIVE OFFICER AND COMMANDING OFFICER OF A NUCLEAR-POWERED SHIP.

COMMANDING OFFICER TRAINING AND QUALIFICATION

Clearly, the one person having the greatest overall responsibility for the safe operation of the nuclear propulsion plant is the ship's Commanding Officer. Therefore, it should not be surprising that each Prospective Commanding Officer is required to attend a course of instruction at Naval Reactors and satisfactorily complete this course prior to reporting to a ship as Commanding Officer.

In the early years of the program, senior sea-experienced officers were selected as commanding officers of the first nuclear-powered ships. These prospective commanding officers received the same type of training that other officers in nuclear ships received. However, the academic instruction was given by members on the Naval Reactors staff at Headquarters in Washington. In addition to formal classroom training, the prospective commanding officers received added material on those subjects affecting the testing and operation of nuclear-powered ships which they needed to know by reason of their responsibilities as commanding officers. Operational training of prospective commanding officers consisted of approximately eight weeks of concentrated instruction and qualification on all engineering watch stations at one of the naval reactors prototypes. They were also required to pass oral and written examinations both at the prototypes and the Naval Reactors Headquarters.

SINCE 1961, PROSPECTIVE COMMANDING OFFICERS OF ALL NUCLEAR-POWERED SUBMARINES HAVE HAD PREVIOUS DUTY ON BOARD A NUCLEAR-POWERED SHIP, AND HAVE THEREFORE UNDERGONE TRAINING AT ONE OF THE NAVAL NUCLEAR POWER SCHOOLS AND AT A PROTOTYPE UPON INITIAL ENTRY INTO THE NUCLEAR POWER PROGRAM. UPON SELECTION AS A COMMANDING OFFICER, THE PROSPECTIVE COMMANDING OFFICER REPORTS TO NAVAL REACTORS FOR A THIRTEEN WEEK COURSE. THIS COURSE IS A CONCENTRATED TRAINING PERIOD COVERING THE NUCLEAR PROPULSION PLANT OF THE SHIP TO WHICH THE OFFICER IS SCHEDULED FOR ASSIGNMENT AS COMMANDING OFFICER. SUBJECTS COVERED INCLUDE MECHANICAL, FLUID AND ELECTRICAL (INCLUDING CONTROL AND INSTRUMENTATION) SYSTEMS, PLANT MATERIALS, REACTOR ENGINEERING, REACTOR THEORY, REACTOR SAFETY AND CHEMISTRY AND RADIOLOGICAL CONTROLS. THE PROSPECTIVE COMMANDING OFFICER IS EXAMINED IN ALL AREAS AND MUST PASS EACH ONE. TWO ORAL EXAMINATIONS ARE ALSO GIVEN COVERING COURSE MATERIAL. A FINAL COMPREHENSIVE WRITTEN EXAMINATION OF SIMILAR LENGTH AND COMPOSITION TO THE PROSPECTIVE ENGINEER OFFICER EXAMINATION IS ADMINISTERED, AND THE PROSPECTIVE COMMANDING OFFICER MUST PASS ALL SECTIONS OF THIS EXAMINATION. IN ADDITION, A FINAL ORAL EXAMINATION ON REACTOR SAFETY IS GIVEN BY A FOUR MEMBER NAVAL REACTORS BOARD. SPECIAL BRIEFINGS BY SENIOR NAVAL OFFICERS AND TRAINING IN SUBJECTS THAT WILL AID THE PROSPECTIVE COMMANDING OFFICER IN RUNNING HIS SHIP ARE INCLUDED IN ADDITION TO THE TECHNICAL TRAINING.

I APPROVE SATISFACTORY COURSE COMPLETION FOR EACH PROSPECTIVE COMMANDING OFFICER BEFORE HE CAN ACTUALLY GO ON TO COMMAND A NUCLEAR SHIP.

OTHER NAVAL REACTORS SPONSORED TRAINING

I HAVE DIRECTED THAT CERTAIN OTHER TRAINING BE CONDUCTED WHEN IT IS REQUIRED TO MEET AN IDENTIFIED SPECIFIC NEED. FOR EXAMPLE, TWO YEARS AGO IT CAME TO MY ATTENTION THAT ELECTRONICS TECHNICIANS WERE SEVERELY LACKING IN THE KNOWLEDGE AND SKILLS TO PROPERLY CONDUCT MAINTENANCE ON THE ELECTRONIC EQUIPMENT ASSOCIATED WITH THE NUCLEAR PROPULSION PLANT. I DIRECTED THE ESTABLISHMENT OF A FIVE WEEK COURSE AT THE PROTOTYPE SITES IN IDAHO AND NEW YORK TO TEACH THE NECESSARY ELECTRONICS REPAIR TECHNIQUES.

AS I HAVE METIONED, SPECIAL DESIGN COURSES ARE TAUGHT FOR THE NUCLEUS CREWS OF SOME NEW DESIGN SHIPS. FOR EXAMPLE, WE TEACH A SEVEN WEEK DESIGN COURSE AT WEST MILTON, NEW YORK FOR THE NUCLEAR TRAINED CREW MEMBERS OF TRIDENT SUBMARINES.

AIRCRAFT CARRIER PROSPECTIVE EXECUTIVE OFFICERS AND REACTOR OFFICERS ARE REQUIRED TO ATTEND THE PROSPECTIVE COMMANDING OFFICERS COURSE AT NAVAL REACTORS, AND CERTAIN FORCE COMMANDER STAFF PERSONNEL ATTEND THE CHEMISTRY AND RADIOLOGICAL CONTROLS SECTION OF THAT COURSE. IN ADDITION, MEMBERS OF MY STAFF AT THE VARIOUS FIELD OFFICES WHO MONITOR PROTOTYPE, SHIPYARD AND SHIP PERFORMANCE ARE REQUIRED TO DEMONSTRATE BY EXAMINATION THAT THEY HAVE AN ADEQUATE LEVEL OF KNOWLEDGE TO PERFORM THOSE DUTIES.

QUALITY CONTROL AND FEEDBACK TO TRAINING

THROUGHOUT MY COMMENTS, I HAVE INDICATED VARIOUS POINTS WHERE A MEASURE OF QUALITY CONTROL IS EXERCISED IN THE TRAINING PROGRAM. I WILL NOW REVIEW AND FURTHER DISCUSS THE KEY MEANS BY WHICH WE CONTROL THE STANDARDS OF OUR SHIPBOARD TRAINING. MONITORS ARE USED BOTH IN THE LECTURE AND SEMINAR AREA AND IN CASUALTY DRILLS. OFFICER AND ENLISTED PERSONNEL ARE USED AS MONITORS, WITH THE PRINCIPAL CRITERIA FOR SELECTION BEING THE INDIVIDUALS'S KNOWLEDGE OF THE AREA HE IS TO MONITOR. FREQUENT EXAMINATIONS ARE USED, NOT JUST TO CONFIRM AN ADEQUATE LEVEL OF KNOWLEDGE BUT TO INCREASE KNOWLEDGE AS WELL. THE NUCLEAR TRAINED PERSONNEL ON THE STAFFS OF THE SHIP'S IMMEDIATE SUPERIORS IN THE CHAIN OF COMMAND (FOR EXAMPLE, SQUADRON OR FORCE COMMANDER) ROUTINELY REVIEW SHIPBOARD TRAINING FOR ITS EFFECTIVENESS. OFTEN THIS REQUIRES THAT STAFF PERSONNEL GO TO SEA AND ACTUALLY OBSERVE THE TRAINING BEING CONDUCTED. THE PRE-CRITICALITY REACTOR SAFEGUARDS EXAMINATION CONDUCTED BY MY STAFF ON SHIPS WITH NEW REACTOR CORES PROVIDE A DIRECT EVALUATION OF THE STATE OF THE CREWS TRAINING.

REACTOR SAFEGUARDS EXAMINATION

THE PURPOSE OF THIS EXAMINATION IS TO DETERMINE IF THE CREW OF A SHIP WITH A NEW CORE IS PREPARED TO OPERATE THE NUCLEAR PROPULSION PLANT, PARTICULARLY FROM A REACTOR SAFETY AND RADIATION CONTROL POINT OF VIEW. RESULTS OF THESE EXAMINATIONS ARE USED TO SUGGEST TO THE PROSPECTIVE COMMANDING OFFICERS AREAS WHERE FURTHER TRAINING IS NECESSARY.

THIS VERIFICATION OF OPERATOR KNOWLEDGE LEVEL IS DONE DIRECTLY BY MY STAFF FOR SHIPS WHICH ARE NEWLY CONSTRUCTED OR BEING REFUELED. A TEAM COMPOSED OF A MINIMUM OF FOUR MEMBERS, REPRESENTING FOUR KEY AREAS OF OPERATOR SPECIALTY, IS ASSEMBLED AND HEADED BY A SENIOR MEMBER OF MY STAFF. THEY GO TO THE NEW CONSTRUCTION OR OVERHAUL FACILITY AND SPEND SEVERAL DAYS INTERVIEWING MEMBERS OF THE NUCLEAR WATCH SECTIONS, OBSERVING PRACTICAL DRILLS AND EVOLUTIONS AND INSPECTING THE MATERIAL CONDITION OF THE SHIP.

AT THE CONCLUSION OF THE EXAMINATION THE TEAM LEADER REPORTS TO ME DIRECTLY WITH A PASS OR FAIL RECOMMENDATION. I PERSONALLY APPROVE ALL RESULTS OF THESE EXAMINATIONS. THIS INSPECTION, CALLED A REACTOR SAFEGUARDS EXAMINATION, OCCURS ABOUT FOUR TO SIX WEEKS PRIOR TO INITIAL CRITICALITY OF THE REACTOR. IMMEDIATELY PRIOR TO INITIAL CRITICALITY, THE SHIPYARD COMMANDER

OR THE SUPERVISOR OF SHIPBUILDING, AS APPROPRIATE, REQUESTS PERMISSION BY NAVAL MESSAGE TO CONDUCT OPERATIONS WITH THE REACTOR AT POWER. I PERSONALLY AUTHORIZE INITIAL CRITICALITY AND SUBSEQUENT TESTING WITH THE REACTOR AT POWER.

THE PROCEDURE I HAVE JUST DESCRIBED IS ALSO USED IN THE CASE OF A LAND-BASED PROTOTYPE WITH A NEW REACTOR CORE.

FOLLOWING THIS INITIAL SAFEGUARDS EXAMINATION, EACH CREW IS EXAMINED ANNUALLY. IN THE PAST THESE ANNUAL EXAMINATIONS HAVE BEEN CONDUCTED BY SENIOR MEMBERS OF MY STAFF. ON MARCH 13, 1967, THE CHIEF OF NAVAL OPERATIONS ESTABLISHED NAVAL NUCLEAR PROPULSION EXAMINING BOARDS ON THE STAFFS OF THE COMMANDER-IN-CHIEF ATLANTIC AND PACIFIC FLEETS.

OPERATIONAL REACTOR SAFEGUARDS EXAMINATION

THE FLEET NUCLEAR PROPULSION EXAMINING BOARDS PROVIDE AN OUTSIDE, INDEPENDENT EVALUATION OF SHIPBOARD TRAINING, ALONG WITH OTHER FACETS OF PROPULSION PLANT OPERATIONS, ADMINISTRATION, AND MAINTENANCE. THESE BOARDS ARE HEADED BY A SENIOR CAPTAIN WHO HAS SERVED AS COMMANDING OFFICER OF A NAVAL NUCLEAR-POWERED SHIP. THE ATLANTIC FLEET NUCLEAR PROPULSION EXAMINING BOARD IS COMPOSED OF SUFFICIENT OFFICERS TO CONDUCT OPERATIONAL REACTOR SAFEGUARDS EXAMINATIONS ON THREE SHIPS SIMULTANEOUSLY. THE PACIFIC FLEET BOARD IS

MANNED TO CONDUCT TWO OPERATING EXAMINATIONS SIMULTANEOUSLY. EACH TEAM CONDUCTING AN OPERATIONAL REACTOR SAFEGUARDS EXAMINATION IS COMPOSED OF FOUR NUCLEAR TRAINED OFFICERS. THE SENIOR TEAM MEMBER HAS PREVIOUSLY SERVED AS COMMANDING OFFICER OF A NAVAL NUCLEAR-POWERED SHIP; THE REMAINING THREE OFFICERS HAVE SERVED AS ENGINEER OFFICER IN NAVAL NUCLEAR-POWERED SHIPS. THE NUCLEAR PROPULSION EXAMINING BOARDS CONDUCT OVER 180 EXAMINATIONS A YEAR OF NUCLEAR-POWERED SHIPS OPERATING AT SEA AS WELL AS RADIOLOGICAL SUPPORT FACILITIES ON SUPPORT SHIPS AND SHORE BASES. THESE EXAMINATIONS LAST FROM TWO TO FIVE DAYS AND LOOK INTO EVERY ASPECT OF NUCLEAR PROPULSION PLANT OR RADIOLOGICAL SUPPORT FACILITY OPERATIONS, ADMINISTRATION, AND TRAINING. CASUALTY DRILLS AND EVOLUTIONS ARE CONDUCTED FOR THE BOARD TO EVALUATE. OPERATORS ARE INTERVIEWED BY BOARD MEMBERS TO DETERMINE THEIR LEVEL OF KNOWLEDGE. ADDITIONALLY, THE BOARD CONDUCTS A DETAILED INSPECTION OF ENGINEERING OR RADIOLOGICAL SUPPORT FACILITY SPACES TO DETERMINE ADEQUACY OF MATERIAL CONDITIONS AND CLEANLINESS. UPON COMPLETION OF THE EXAMINATION A GRADE IS ASSIGNED AND A TREND IS DETERMINED RELATIVE TO THE SHIP'S PREVIOUS PERFORMANCE.

THE OPERATIONAL REACTOR SAFEGUARDS EXAMINATION REPORT PROVIDES THE INDIVIDUAL SHIP WITH IMMEDIATE FEEDBACK THAT IT CAN USE TO IMPROVE TRAINING AND OPERATION. THESE REPORTS ALSO

PROVIDE NAVAL REACTORS THE OPPORTUNITY FOR AN OVERALL LOOK AT FLEET NUCLEAR PROPULSION PLANT TRAINING AS WELL AS HOW INDIVIDUAL SHIPS ARE DOING. THE RESULTS OF THE EXAMINATION, INCLUDING THE GRADE AND TREND ASSIGNED, ARE REPORTED TO THE SHIPS OPERATIONAL COMMANDER, THE CHIEF OF NAVAL OPERATIONS AND TO ME. SHIPS THAT HAVE SIGNIFICANT WEAK AREAS ARE REQUIRED TO SUBMIT A WRITTEN REPORT OF CORRECTIVE ACTION WITHIN A SPECIFIED PERIOD FOLLOWING THE EXAMINATIONS. EXAMINATION REPORTS ARE USED TO UPGRADE THE PERFORMANCE AND TRAINING OF THE CREWS OF ALL NUCLEAR-POWERED SHIPS AND RADIOLOGICAL SUPPORT FACILITIES; AND, WHEN NECESSARY, TO INITIATE CHANGES IN THE OVERALL TRAINING PROGRAM INCLUDING NUCLEAR POWER SCHOOL AND PROTOTYPE TRAINING.

I DISCUSS THE RESULTS OF THE EXAMINATION WITH EACH COMMANDING OFFICER BY PHONE - BECAUSE FOR MOST PART THEY ARE IN VARIOUS PARTS OF THE WORLD. IF I CONSIDER IT NECESSARY, I ASK HIM TO WRITE ME AND TELL ME WHAT HE WILL DO TO IMPROVE THE PERFORMANCE OF HIS SHIP.

PERSONNEL FROM MY STAFF CONDUCT ANNUAL EXAMINATIONS AT THE LAND-BASED PROTOTYPES. A WRITTEN REPORT OF CORRECTIVE ACTION IS REQUIRED IN ALL CASES WITHIN A SPECIFIED PERIOD FOLLOWING THE EXAMINATION. AGAIN, THESE SAFEGUARDS EXAMINATIONS REPORTS PROVIDE FEEDBACK USEFUL IN IMPROVING THE TRAINING PROGRAM.

INCIDENT REPORTS

To ensure that I am kept fully aware of problems associated with naval nuclear powered plants (both ship and prototype), I require the Commanding Officer or Prototype Managers to report to me directly any equipment malfunction, operational difficulty, or deviation from prescribed procedures. These written "incident reports" are in addition to other formal Navy requirements and are uniquely designed to satisfy the technical requirements of nuclear power. They describe in detail what has happened, why it happened, and what has already been done locally to correct the problem and rrevent a recurrence. I read every report and ensure that adequate corrective action is taken in each case. My staff reviews each report in depth in their particular area of interest. They also monitor for trends indicative of a problem common to several plants or common only to one type of plant.

This rapid feedback of design, material, personnel, or procedural problems has proven invaluable in improving the reliability, safety and performance, both of the equipment and of the operators. Many times apparently inconsequential failures, when investigated fully, have lead to actions which prevented more serious incidents from occurring.

These fleet and prototype incident reports also sometimes

DESCRIBE CASES WHERE, HAD THE INDIVIDUAL BEEN BETTER TRAINED, HE MIGHT HAVE AVOIDED AN ERROR IN THE PERFORMANCE OF HIS JOB. LESSONS LEARNED FROM THESE REPORTS ARE PERIODICALLY PROMULGATED TO THE FLEET IN NAVAL REACTORS TECHNICAL BULLETIN ARTICLES, AND CHANGES MADE, IF NEEDED, TO DESIGN AND TO THE OVERALL TRAINING PROGRAM.

MONITOR WATCH PROGRAM

I PREVIOUSLY INDICATED THE IMPORTANCE OF INSPECTIONS IN REGARD TO MAINTAINING HIGH STANDARDS. THESE INSPECTIONS COME IN MANY WAYS AND FORMS BUT ONE OF THE MOST EFFECTIVE IS THE MONITOR WATCH. THE MONITOR WATCH IS A SURVEILLANCE CONDUCTED BY SOMEONE, KNOWLEDGEABLE IN A GIVEN AREA, TO OBSERVE AND DETECT DEFICIENCIES IN PERFORMANCE THAT OCCUR DURING THE PERIOD OF OBSERVATION. EXPERIENCE HAS SHOWN THAT THESE MONITOR WATCHES SHOULD BE AT LEAST TWO HOURS IN LENGTH SO THAT THE INSPECTOR BECOMES PART OF THE BACKGROUND AND THE CREW PERFORMS AS THEY WOULD WITHOUT A MONITOR PRESENT. I REQUIRE MY REPRESENTATIVES IN THE FIELD (SHIPYARDS AND PROTOTYPES) TO CONDUCT MONITOR WATCHES PERIODICALLY PARTICULARLY DURING THE NIGHT, AND REPORT THE RESULTS DIRECTLY TO ME. THE FORCE COMMANDERS HAVE A SIMILAR MONITOR WATCH SYSTEM IN WHICH NUCLEAR TRAINED STAFF MEMBERS CONDUCT MONITOR WATCHES ON THE SHIPS ASSIGNED TO THEIR COMMAND. I RECEIVE COPIES OF THE MONITOR WATCH REPORTS THAT ARE SUBMITTED UNDER THE FORCE

COMMANDERS SYSTEM. IN ADDITION, MEMBERS OF THE NUCLEAR PROPULSION EXAMINING BOARD CONDUCT MONITOR WATCHES ON SHIPS IN THE AREA WHERE THEY HAVE JUST COMPLETED AN EXAMINATION. THE MONITOR WATCH MAY IDENTIFY PROBLEMS IN ANY PROPULSION PLANT AREA INCLUDING TRAINING. MONITOR WATCH REPORTS, THEN, ARE ANOTHER FEEDBACK SYSTEM TO THE OVERALL TRAINING PROGRAM.

COMMANDING OFFICER'S LETTERS

I REQUIRE EVERY COMMANDING OFFICER OF A NUCLEAR POWERED SHIP TO WRITE A PERIODIC PERSONAL LETTER TO ME DISCUSSING PROPULSION PLANT PROBLEMS. INCLUDED IN THIS LETTER IS A LISTING OF ALL RECURRING NUCLEAR PROPULSION PLANT TRAINING THE COMMANDING OFFICER HAS CONDUCTED ON HIS SHIP SINCE HIS LAST LETTER. THIS LISTING CONTAINS THE TRAINING SUBJECT, DATE, WHO ATTENDED BY CATEGORY, (FOR EXAMPLE ALL EOOW'S), NUMBER OF PEOPLE ATTENDING EACH SESSION, WHO MONITORED THE TRAINING, GRADES ON EXAMINATIONS GIVEN, DRILLS AND EVOLUTIONS CONDUCTED FOR TRAINING, AND SCHOOLS ATTENDED BY NUCLEAR TRAINED PERSONNEL. THIS TRAINING SUMMARY IS EVALUATED BY MYSELF AND MEMBERS OF MY STAFF FOR ADEQUACY OF CONTENT AND EXTENT. IF IT IS NOT CONSIDERED ADEQUATE, THE COMMANDING OFFICER OR IN SOME CASES HIS BOSS IS CALLED AND THE WEAKNESSES POINTED OUT. MY DIRECT AND PERSONAL INTEREST IN EACH SHIP'S TRAINING SHOULD BE OBVIOUS.

NUCLEAR PROPULSION PLANT TRAINING - FINAL COMMENTS

I HAVE PROVIDED A DETAILED DESCRIPTION OF THE NAVY NUCLEAR PROPULSION PLANT TRAINING PROGRAM. HIGH STANDARDS OF PERFORMANCE ARE MAINTAINED THROUGH USE OF PROVEN TRAINING METHODS WITH RELIABLE QUALITY CONTROL CHECKS TO ENSURE THAT TRAINING IS CONDUCTED PROPERLY. BOTH THEORETICAL AND PRACTICAL TRAINING ARE INCLUDED. THE RESULTS OF SEVERAL DIFFERENT INSPECTION AND REPORTING SYSTEMS ENABLE ME CONTINUOUSLY TO EVALUATE THE TRAINING BEING CONDUCTED FOR ITS ADEQUACY. THESE RESULTS ARE ALSO EVALUATED TO DETERMINE AREAS WHERE NUCLEAR POWER SCHOOL AND PROTOTYPE TRAINING NEEDS IMPROVEMENT OR MODIFICATION. IN THIS MANNER, THE OPERATIONAL EXPERIENCE OF THE NUCLEAR PROPULSION PLANT OPERATORS IS CONTINUOUSLY FACTORED BACK INTO THE TRAINING PROGRAM.

THIS SPEECH REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

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DEMOCRACY AND BUREAUCRACY

by

VADM H. G. Rickover, USN
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The theme to be discussed this afternoon is so broad in scope; it has so many ramifications that one cannot do it justice in a brief speech. There isn't time to buttress statements of fact with example and proof, to lay proper foundations for the ideas one wishes to develop, to give due consideration to every important facet. Of necessity, one has to be blunt, unsubtle, didactic.

Conscious as I am of the limits of time at my disposal, I am even more aware of the limits of my competence. I am not professionally qualified to speak with authority on the prospects of democracy in this age of giant bureaucracies.

It is true I have spent my adult life in a public bureaucracy and I have worked closely with other public agencies and with the bureaucratic organizations through which large-scale private enterprise functions. This

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practical experience, augmented by much relevant reading and reflection has led me to certain conclusions. These I will submit to you, but I would ask that you take them for what they are: personal opinions, not expert testimony.

The juxtaposition in our topic of democracy and bureaucracy calls attention to their antithetical characteristics, and raises the question whether they can coexist without adversely affecting each other; or rather, since we are committed to a free and democratic society, whether bureaucracy can be smoothly integrated into democracy.

The problem resolves itself into discovering the essence of the democratic creed, the function of bureaucracy in a modern society; the particular characteristics that make bureaucracy efficacious, and how these can be modified to harmonize them with the tenets of democracy without thereby reducing the special aptness of bureaucracy for certain tasks that must be done.

We have not been particularly successful in this matter, partly I believe because we dislike theoretical analysis and prefer piecemeal practical solutions for political problems. But this is a problem that has to be explored in depth before a practical formula can be found that will permit bureaucracy to function effectively, yet prevent it from perverting the democratic process or violating the democratic creed.

To grasp the essence of democracy one must look into the intent of the founders of our nation: what purpose did they wish to accomplish? The era in which they lived gives us a clue. They were men of the Enlightenment. They were part of it in spirit though separated in space from its leaders. This was a broad-ranging intellectual revolt against every custom and institution that shackles the mind of man or arbitrarily restrains his action. It was an assault mounted by philosophers on the status quo wherever it diminished the individual--from superstition to class privilege, from tyranny by an established church to tyranny by an absolute monarch. The specific political issue with which they wrestled was public power: how to limit it so individuals might be free.

The Enlightenment coincided with the era of Mercantilism, when monarchical absolutism was at its apogee. Against the divine right of kings, the philosophers reactivitated the old theory of popular sovereignty. It had only fitfully been realized in the past and never in any but very small political units. The United States was the first large nation to make popular sovereignty the foundation of a political system. Conscious that power, from whatever source it might spring, tended to feed on itself and grow so large that it crushed the individual, Montesquieu urged that its public functions be separated. "There can be no liberty," he said, if executive, legislative and judicial powers are in one hand. "Things must be so arranged that one power checks another." This has been most completely realized in our political system which not only separates these three powers but through checks and balances sets them to curb one another.

At bottom the problem of power was a problem of how to reconcile civilization with individual liberty. Rousseau lamented that "man is born free, and everywhere he is in chains." The chains seemed to be forged by civilization itself, for the noble savage, whom the philosophers romanticized unduly, knew how to remain free. When men entered civilized society, their social needs generated power which in the end suppressed their liberties.

Madison appears to have contributed most to the resolution in our political system of the conflict between individual liberty and civilized social living. In his Memorial and Remonstrance Against Religious Assessments, he analyzed the nature of the right of freedom of conscience guaranteed in the Virginia Bill of Rights of 1776 which he himself had drawn. It was absolute, he argued, and precluded any legislative action touching even remotely on religious matters. This was a right, he said, that is not lost because "a man enters civil society." And again, "no man's right [of conscience] is abridged by the institution of civil society." Here and elsewhere he drew with great clarity a distinction between rights men must sacrifice in order to obtain a government that will enable them to live together in peace and prosperity, and rights that are not or should not be sacrificed since they are an intimate part of man as a human being. This distinction between alienable and inalienable rights is perhaps the greatest American contribution to the concept of democracy as a viable system of government. It erects a fence around the private realm of the autonomous citizen from which government is excluded. At any rate, into which government may enter only via the slow and cumbersome amending process.

The idea that government should refrain from infringing certain individual rights was of course not new. But combined with self-government it made for a far stronger injunction than anything known at that time. In Magna Carta the king promises he "will not" do the things listed in the charter; the English Bill of Rights of 1689 says the king "ought not" to do them, but our own Bill uses the words "shall" and "shall not." Because we have a government that derives its "just powers from the governed," and the persons who do the actual governing, hold "their offices during pleasure, for a limited period, or during good behavior," the American Bill of Rights is a command addressed by the people to their government; of a principal to his agent. The binding nature of the injunction is further strengthened by the power of the American judiciary to declare laws void if they contravene the Constitution.

Hamilton in the Federalist comments on the happy mean between "the energy of government and the security of private rights" attained in the Constitution. In a passage which at the time may have seemed presumptious but which has proved remarkably prophetic he warned that if we are not cautious "in our future attempts to rectify and ameliorate our system, we may travel from one chimerical project to another; we may try change after change; but we shall never be likely to make any material change for the better."

I quote his words because once again we are face to face with the problem of reconciling individual liberty with the requirements of civilized living. In a modern society bureaucracy is unavoidable. It is a kind of government, though limited to a single purpose. In a vital part of their lives it rules people who work within the bureaucracy and it rules them in a wholly undemocratic way. It is a system for organizing social power antipodal to democracy, as the etymology of the words indicates.

In democracy the locus of power is in the people. They may exercise it directly, as in the "pure" democracies of antiquity where citizens took turns acting as magistrate, judge, soldier. Or they may delegate it to persons elected for public office, as in modern "representative" democracies--congressional or parliamentary. In either case, public officials are agents of the people and accountable to them for their public acts.

Viewed as a closed system--that is, without reference to outside control over the organization--bureaucracy has its locus of power in the top official, who is supreme within the bureaucracy. The bureau head assigns work and authority to those subordinate in rank to him. Commands are transmitted from the top down through clearly defined levels of authority; accountability is from the bottom up through the same channels. The final decision lies with the bureau head and he is accountable to no one within the organization.

Obviously, as a power system bureaucracy is the twin of absolute monarchy and the obverse of democracy. It thus cannot but have some of the deleterious effects on the people who work in it that J. S. Mill attributed to even the most perfect of absolute monarchies. "Their passivity is implied" he wrote, "in the very idea of absolute power." And he asks "what sort of human beings can be formed under such a regimen?" This to me is the major problem in any effort to integrate bureaucracy into our democratic society.

Implicit in democracy is the correlation of liberty and responsibility. A citizen is a person with private rights and public duties. In an ovbrsimplified way, one could say that he safeguards his private liberties by conscientiously attending to his public responsibilities. Democracy will not function well unless at least a majority of citizens recognize this correlation and act accordingly. Individual rights will be lost unless they are, as it were, earned by each generation through active and intelligent participation in public affairs. The very qualities in man that are needed in the citizen of a democracy tend to be stunted by life in and under bureaucracy.

The existence of bureaucracy in the midst of a democratic society raises a further question. How can persons outside the bureaucracy, who depend on its services or are subject to its regulations, exert the influence that under our political philosophy inheres in the sovereign people? Especially now that it is armed with public relations techniques that can be misused to hide the truth from the people. Bureaucracy thus often becomes extraordinarily resistant to public criticism and unresponsive to public demand that it alter its practices or otherwise reform itself. It can be made accountable to the people only through the general government. The manner in which the general government controls the bureaucracy is thus crucially important. Since the growth of bureaucracy was not foreseen by the Constitution makers, they made no provision for its relationship to the general government.

It is left to us to strike a new balance between individual liberty and the requirements of a society now dominated by bureaucracy both in the public and in the private sphere. To guide us we must depend largely on what the Federalist calls the "genius" of our system.

Bureaucracy antedates modern democracy by centuries. It persists in our society because no one has yet invented an instrument equally efficient in performing tasks--on a continuing basis--that require coordination of the efforts of large numbers of people, with different kinds and degrees of professional expertise relevant to the job at hand, especially when their work must be closely intermeshed. Able administrators have shaped bureaucracy for the intricate business of public administration. In so doing, they have also made it a most effective instrument for the management of large affairs and enterprises in general.

In popular usage the word bureaucracy has a pejorative implication, but only when applied to government agencies. Most Americans dislike and fear huge bureaucratically organized power conglomerates in government but are not even aware of similar conglomerates outside government. This gives them a lopsided picture of American society as a vast market place where individuals compete with each other in a free and fair fashion, the best man wins and the consumer is sovereign. Upon this free market descends a huge and menacing government bureaucracy intent on imposing its will on the hapless traders. There is a widespread--assiduously promoted--belief that bureaucracy is synonymous with government. What gives this plausibility is that at one time--some two centuries ago--in the mercantilist age, when monarchical absolutism reached its height, this was largely true.

Men like Louis XIV should have amended their boast to read "the State is I and my bureaucracy," because it was through his bureaucracy that an absolute king ruled. The hatred of the people against this instrument of royal government was justified for he used it chiefly for his own purposes, with little regard for the interests of his subjects. Thus the bureaucracy administered the monarch's mercantilist policies which served no purpose other than to provide him with the wherewithal for waging dynastic wars. It was said of 18th century Prussia that it "was not a country with an army, but an army with a country which served as headquarters and food magazine." The king's bureaucracy managed the country to this end. Much the same was true of every other absolute monarchy of the time.

Most Americans have a picture of this absolutist bureaucracy in their minds when they speak unfavorably of "the bureaucracy." But in a modern democracy, the administrative apparatus of government is something quite different. With all its faults, it has been set up, and it carries out the tasks assigned to it by the general government, itself chosen by and accountable to the people. Apart from this vital difference, there is the equally important difference that a democratic government does not normally expand the bureaucracy in order to make itself more powerful vis-a-vis the people. Bureaucracy in government expands for the same reasons that bureaucracy in private life expands: explosion of population and technology.

When the term is used in too narrow a sense this tends to be overlooked. The word bureaucracy now has a broader meaning because the phenomenon it describes is to be found in a wider range of circumstances. Any organization that in structure and modus operandi resembles the classical pattern of bureaucracy, is properly termed a bureaucracy. These characteristics, rather than the particular area--public versus private--in which it operates, convey the bureaucratic cognomen upon a given organization.

Bureaucratic organizations are today as numerous in the private as in the public sphere. They proliferate because every area of national life is now dominated by giant organizations, and bureaucracy is the inevitable concomitant of giantism. In no other democratic country has bureaucratization of life gone as far as with us.

Not all our giantism is necessary. If we wished, we could eliminate some of it. As in education, where enormous factory-like institutions are neither beneficial to students nor even particularly efficient--in terms of education if not of expenditure. In other Western nations schools are kept small, there is virtually no bureaucracy, and the results surpass our own. There are other areas where size serves no useful purpose or where its advantages are outweighed by the undesirable side effects of bureaucratization. However, most American giantism is ineluctable, given the size of our population and the imperatives of modern technoscience.

The world has never seen a population growth to equal our own. In the last two centuries we have multiplied a hundredfold while in most of Western Europe growth has been on the order of three to five fold. Immigration accounts for this only in part. Despite its virtual cessation some fifty years ago, we continue to increase at a faster rate than other industrial nations. We should reach the billion mark in a century.

Urbanization, too, proceeds faster here. A generation ago, we were predominantly rural; now two thirds live in huge urban and suburban conglomerations. There is no sign of an end to this mass movement into the cities, for the same pressures that destroy small owner-enterprise in industry appear to be working on the family farm. It is now threatened by a new type of large landed estate--the commerical factory farm. As always, technology produces a surplus of goods and a scarcity of jobs. This is happening faster here than abroad where the social value of family farming appears to be rated higher than maximum productivity.

In a scarcely populated country where most people live on farms and in small towns few government services are needed. But when space around a man contracts, more rules are needed to discipline his behavior toward others. The restraints that knowing one's neighbors imposes are lost in the anonymity of city life. It takes a big bureaucracy merely to maintain peace among the multitudes and keep their cars circulating freely, not to mention supplying them with pure water, public health services, sewage disposal facilities and so on, and so on.

Modern technology has placed in the hands of man the means to do much greater harm than was ever before possible, both to fellow citizens and to society at large. The individual is helpless to protect himself against consequences of misuse of technology that result in soil erosion, air and water pollution, or against substances harmful to him in "miracle" foods, drugs, pesticides and weed killers--to name but a few. He must call on his government for help.

Even as misuse of technology leads to growth of the public bureaucracy, so the desire to extract from technology the ultimate in material affluence leads to growth of private bureaucracies. Maximum utilization of modern technology requires large organizations and these, as I said before, cannot be managed efficiently except in a bureaucratic manner.

The changes wrought by explosion of population and technology have happened so fast that we do not yet fully grasp their consequences. Still cherishing our traditional ideal of a government that is small, costs little, and hardly touches us in our private lives, we put the blame for bureaucracy and big government everywhere except where it belongs--on ourselves. It is we who have created the conditions that make it indispensable; we with our heedless passion for change, for instant scientific "miracles," for bigness *per se*, for endlessly increasing material affluence.

We have created a way of life that is dominated by large bureaucratic organizations. Most of us work for such organizations--only 15% are now self-employed--all of us consume their products and are subject to the rules they impose on us. We must learn to live *with* them rather than *under* them. This means we must constantly be on the alert that they do not dwarf man--the individual unorganized citizen in whom is grounded our free society.

It is our misfortune that the Founding Fathers left us no guidance on how to deal with bureaucracy. We have never since had men their equal--men who were both first-rate political thinkers and outstandingly capable practical politicians, besides possessing great civic courage. This rare combination of qualities accounts for the straightforward manner in which they went to the root of any given problem, found a practical way to solve it, and did not hesitate to advocate their solution, no matter how startlingly revolutionary or "controversial" it might have appeared to their countrymen. All our later efforts to adapt government to the changing needs of our society have been less successful than the initial act of creation. Chiefly, I believe, because we have been content with ad hoc measures.

The veneration we rightly feel for the Constitution makes exploration in depth of our political system seem almost sacrilegious. Yet if the makers of the Constitution lived today they would not hesitate to question our ways of managing democracy if these appeared to them unsatisfactory. Unlike ourselves, who constantly confuse principle with procedure and tenet with technique, they would proceed forthwith to reassess our procedures and techniques in order to discover whether--under present-day conditions-- these still serve to realize the basic principles and tenets of democracy.

I presume this is what Jefferson meant when he spoke of the need of "permanent revolution." Technological changes may so alter the consequences of established democratic processes as to produce results that are the very opposite of what democracy seeks to attain: preservation of the individual as an autonomous human being, and government chosen by and accountable to the people. Bureaucracy is a case in point. Present practices have no sanctity except insofar as they conform to the tenets of democracy.

The Constitution mentions neither bureaucracy nor public administration. There are references to "officers" of the United States and "office" under the United States; provision is made for the President by and with the advice and consent of the Senate to appoint all officers of the United States. Also, Congress "may by law vest the appointment of such inferior officers, as they think proper, in the President alone, in the courts of law, or in the heads of departments," and the "principal officers in the executive departments" must, on request by the President, "submit opinions, in writing, upon any subject relating to the duties of their respective offices." On this slender basis rests the vast bureaucracy which by sheer numbers now all but dwarfs Congress and the Judiciary--the only part of government that remains free from bureaucratic accretions. The federal bureaucracy accounts in large part for the enormously enhanced power of the President vis-a-vis the other two coordinate branches of government. This imbalance was neither foreseen nor desired by the framers of the Constitution.

In the absence of constitutional rules, it seems to me we might with profit examine how the nations of Western Europe have gone about fitting bureaucracy into their political systems. These, no less than our own, are fruits of the Enlightenment. Throughout the Western world democracy has a common intellectual origin. We tend to look askance at the democratic procedures of others, asserting that we alone are a true democracy. Besides irritating our allies, this attitude cuts us off from a valuable source of information.

The bureaucratic apparatus of modern West European democracies traces back across centuries to the permanent corps of officials employed by feudal kings to administer the royal household. It has a consecutive history: there has been no sharp break and new start as with us. Bureaucracy has in turn been adapted to feudal, absolute and constitutional monarchy and to parliamentary democracy (with or without a king). Europeans have had much experience fitting bureaucracy into different kinds of government.

Over the years they have made many improvements in the structure of bureaucracy in order to insure that it will offer efficient, incorruptible, technically competent service. These are worth our attention. We may find that some practices we think of as uniquely American and sacrosanct have long since been dropped abroad and replaced by practices deemed preferable.

For brevity's sake, I shall call the earlier bureaucracy under feudal and absolute monarchy a _proprietary bureaucracy_; the modern form a _public bureaucracy_. The first was essentially a private service for it administered what the king considered his personal affairs. Under feudalism this included, besides the royal household, his private estates and such few public matters as fell within his jurisdiction. Under absolutism, the national realm had become virtually indistinguishable from the royal domain, other power centers in the nation having been reduced to near-impotence: the bureaucracy was in effect the national government.

The four characteristics of public bureaucracy are hierarchy, professionalism, permanence and impersonal rules for entry and promotion, as well as other interpersonal relations. Traditional to feudalism and absolutism, hierarchy is today based entirely on competence and experience. The bureaucracy is staffed top to bottom by a career civil service. Entry is by competitive examinations open to all. Permanence, that is tenure, is an essential part of the service. The rules of the bureaucracy are its legal system, so-to-speak. They were originally introduced to prevent arbitrary misuse of power by superiors over subordinates. As with us the rules tend to deteriorate into a rigid routine that stifles innovations and slows action, but the high-level professional qualifications in the best West European bureaucracies counteract this to some extent.

Left behind forever are such aspects of the proprietary bureaucracy as meddling into the internal affairs of the bureaucracy by the ruler: awarding high positions on grounds other than merit: for instance upon receipt of a money gift to the ruler or the top bureaucrat, or as a favor to an individual for personal reasons, or to a special class; as when, contrary to the wishes of the ruler, noblemen were given preference over better qualified commoners, in order that the "image" of the bureaucracy as an aristocratic corps might be preserved. Some vestiges of these earlier practices still exist with us.

Bureaucracy is fitted into parliamentary democracy by placing each major administrative department under a political leader appointed by the party in power. He makes certain that the incoming party's policy is carried out but does not demote or dismiss a bureau head for having carried out a contrary policy of the preceding party. Still less would he demote or dismiss the bureau head because of displeasure over previous technical actions of the bureau--as can happen here because we do not allow bureaucracy the technical autonomy it enjoys abroad. Also because we confuse the functions of the technical career head of a bureaucracy and those of the political officer set above him. On this point the Europeans have a better policy.

The career civil service staffs the entire bureaucracy, hence the job of career head is not affected by party changes. He is permanent and technically expert. The political superior--a minister, corresponding to our department secretary--is temporary, technically amateur but politically proficient. His job is political, not administrative. To qualify he must have had experience as a politician. Thus, in his own field he is as expert as the career head in the technical field.

Thus bureaucracy is professionalized throughout. Because a career to the top is open to them, first-rate professional men will enter and remain in civil service. Absence of political meddling with technical problems allows them to act and feel as true professionals. One cannot be a professional if he must submit to orders in technical matters from persons who have no technical qualifications, merely raw power.

The Hoover Commission's Task Force on Personnel and Civil Service, in its 1955 report, comments on the absence in the government bureaucracy of a "system to provide top management personnel." It notes that "functions of political executives, who serve at the pleasure of the Chief Executive, and of career administrators, who continue unless removed for cause, have been confused. Their respective functions and complementary relationships have not been clearly recognized. Policies and procedures have not been developed to meet the Government's needs, for either of these essential types of talent." The detailed recommendations of the Commission would bring our practice closer to the West European formula. They have not been adopted.

Among advanced democracies, we alone have no professional career civil service. Top jobs in the bureaucracy seldom go to an experienced civil servant who has risen in the ranks; they go to outsiders. Jacksonian democracy first made it official dogma that patronage and rotation in office were democratic, while permanence or tenure and professionalism were elitist and smacked of European aristocracy. Jackson felt that government jobs were something anybody could fill; to set educational qualifications, which average citizens could not meet, was intolerable in a democracy. From this extreme position we have gradually been forced to retreat, as the right of the public to competent professional service took precedence over the right of every citizen to get his share of the spoils of victory. The lower echelons in government service are now under civil service. The top ones are not, or only rarely.

Both technical heads and political heads of bureaucracies are patronage jobs though this uncouth word is not used at this high level. The criteria that govern appointments seldom relate to true fitness for the job. Common sense would suggest that the technical headship of a bureaucracy ought to go to a person with long and distinguished public service who possesses the specific technical competence required to administer the organization; and that the political headship ought to go to a person with political experience. But we are bemused by the myth of the "pure" administrator.

He is a uniquely American phenomenon: a man who makes a career of administering organizations. As Mirabeau noted, "to administer is to rule." The "pure" administrator is a special sort of ruler; that is his metier. In the past, noble blood was thought, in a mysterious way, to confer skill in the craft of ruling. We believe that courses in leadership, administration and handling people will do it. We organize almost any large enterprise--private or public--so as to put the technical people under the "pure" administrators. By technical people I mean the persons who do the work for which the organization exists: teachers in education, for instance; production men in industry.

Abroad an administrator in any large organization is expected to be professionally qualified; he learns management on the job, not from college courses. In government, great emphasis is laid on in-service training over a long period before a bureaucrat begins to make decisions. Here it may happen that a first-rate technical man is overruled on technical matters or meddled with in his work by some boy fresh from college who, on the strength of leadership and suchlike courses, rates as an administrator, and therefore is automatically superior to the technical man who may have had years of experience. That counts for nothing; he isn't a "ruler."

It is odd that we should have this veneration for professional rulers of organizations. There is some justification for it when an organization performs routine jobs or technical work that is not too complicated to be understood by the top man, even though his special training--like that of the court officials of feudal kings--has prepared him only for organizational housekeeping, with perhaps some ceremonial chores thrown in. But when the technical work of a bureaucracy is complicated and the staff is professionally competent, superimposing these "pure" administrators leads to friction, poor work, and the loss of capable men who won't work under such conditions. It is no hardship to serve a man who is superior to you in the competence that really counts on the job, but it is galling to have to let a man overrule you in matters where you are expert and he is ignorant.

Just as in days gone by noblemen were thought to be endowed with the ability of managing any enterprise, so we consider the "pure" administrator who has risen to the top in one kind of bureaucracy capable of stepping into a top job in any other--from heading a large private bureaucracy into the headship of a federal department.

The work experience of such a top administrator qualifies him no more for the political leadership job than it qualifies him to administer a bureau with whose technical work he is unacquainted. He may, of course, on his own have acquired the knowledge, breadth of thinking and concern for the public interest that is needed in the political headship job. We have been lucky to have such men, but they are rare. To base our system on finding men of this caliber does not recommend itself.

The bureaucracy manages reasonably well when it does more or less established administrative work. But when we require it to work in high level technology, we pay an exorbitant price for our poorly devised system. Our leadtimes are overlong; part of the reason must be ascribed to the structure and opus operandi of bureaucracy. The higher our technology, the less important is the "pure" administrator. He has his functions, but properly he should be working under a top technical man: for instance, school administrators ought to do their housekeeping chores under a teacher principal.

I have oversimplified somewhat to make my point in the short time available. Not all Western European countries successfully apply the formula I have described, but all subscribe to it. I believe we might do well to examine and possibly adapt it to our own needs. Nothing in the formula would make it unacceptable to us. Like hospital operating room procedure it has universal validity because it best serves the purpose for which it is intended.

A final word on the effect of bureaucracy on the individual who works in it. Democracy is not merely a political system; it partakes of the elements of a faith. Its first commandment may be expressed in the Kantian imperative: "Every man is to be respected as an absolute end in himself; and it is a crime against the dignity that belongs to him as a human being, to use him as a mere means for some external purpose."

As it is structured, bureaucracy all too easily permits men to be used for the ends of the organization in ways that diminish the liberties they are supposed to enjoy in our free society. Not infrequently, these ends may in fact be merely the personal predilection of the men at the top who come to think of the organization as their property. This is the crime par excellence of pure administrators whose sense of worth comes from their position in the hierarchy alone. It is less prevalent among men who are true professionals, who are allowed to function as professionals, and who owe their status to their own merit. The more we professionalize bureaucracy, the more democratic it will become. A hierarchy based purely on merit diminishes no man.

The right to be judged only by one's own peers is or should be "inalienable." This could be our own distinctive contribution to the problem of fitting bureaucracy into democracy.

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THE DECLINE OF THE INDIVIDUAL

by
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on the occasion of the
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In recent years a sense of uneasiness has crept upon the American people. We have lost some of our exuberance, some of our faith in ourselves. Many of us are disturbed by the loss of good things we cherish as peculiarly American and by the intrusion of distasteful things we never expected would invade our way of life. These changes have been many and various, but they all have a common root: They stem from factors which have conspired to diminish the freedom and dignity of the individual.

These human values are essential in a democracy; anything that threatens them makes our whole society a little less free, our nation a little less strong. The basic tenet of democracy is respect for the equal moral worth of all human beings and the equal freedom of all men to shape their lives as they see fit, provided only that they harm no one and violate no law. Only the self-determining, independent citizen can make a success of self-government.

Yet these same values can be neither created nor preserved without continuous effort, and that effort must come from the people—or rather, from

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the individual citizen. Self-government will not produce a good society unless enough citizens feel an identification with the fate of the nation. Repeating patriotic clichés is not enough.

Even were it conceivable that we might prefer other things to freedom—perhaps self-indulgence or social irresponsibility or political apathy—the problems which our country faces today forbids such folly. A democracy cannot afford to forego a single one of the advantages inherent in a free society: the mutual trust that flourishes in freedom, the release of human initiative and energy, the pragmatism and tolerance that prevent enslavement to dogmatic ideology—these are what give democracy flexibility and strength.

Our nation was launched with a system of government containing numerous safeguards to protect individual liberties. Careful reading of the Declaration of Independence shows that our society pivots on the free citizen. Observe the order of precedence: First there is the statement that all men are born equally endowed with "unalienable rights" and some of these are listed; then the Declaration notes that governments "are instituted among men" to "secure" these rights; and finally it is stated that government derives its "just powers" from the governed. Clearly, the Founding Fathers wanted to make certain that Americans never would be ruled by anyone who had not received their express mandate.

Over the years, however, and especially since the coming of the Industrial and later the Scientific Revolution, radical changes have occurred in our way of life, some of them inimical to the free individual in whom our society is grounded.

The first major threat to individual freedom lies in the replacement of what sociologists call the Protestant ethic, which prevailed in this country until the turn of the century, by a new so-called Freudian ethic. Put in simple terms, the Protestant and Freudian ethics stand for two opposite concepts of man. The first sees him shaping his own destiny, being governed by standards he sets himself and by his own conscience, therefore responsible for his own acts. It is the spiritual foundation of democracy. The second sees man ruled by unconscious drives and external pressures, hence not really responsible for his acts. His life is shaped not by himself but by his socioeconomic environment; if he becomes a failure or a criminal, not he but society is to blame.

American egalitarianism reinforces this caricature of Freud's concepts. Mediocrity excuses itself as the normal and healthy state of mankind. The uncommon man who excels thus becomes a sort of unnatural freak. Conformity to the environment in which one happens to find oneself becomes the safe and approved aim. That this shrivels individual autonomy is a fact not always immediately perceived.

The process starts with the "progressive" school and the permissive home. Emphasis is placed on self-expression rather than on self-discipline; on group adjustment rather than on development of the individual's innate capacities; on gaining popularity with the "peer" group rather than on becoming an independent, self-determining adult human being. The educationists' avowed intent to use the school for leveling out human differences strikes me as an assault on the child's basic humanity. Unlike animals who are equipped only for the one kind of life proper to their species—peer group if you like!—man is infinitely diverse in talents and interests. The higher the cultural level, the greater this diversity; passive adjustment to a group belongs to a more primitive age of man.

Group conditioning in the school makes itself felt in adult life. Increasingly, Americans seek comfort and security through belonging to a particular segment of society. People huddle together in communities populated exclusively by members of some one such segment, and pattern their personal behavior on group standards. What is particularly disturbing is the resentment that tends to be generated in these closed groups against anyone who thinks independently and who must therefore at times differ from approved "group thought."

All new ideas begin in a nonconforming mind that questions some tenet of the "conventional wisdom." All improvements originate in a critical mind that mistrusts the "image" projected by some powerful organism. The innovator of ideas and the social critic are essential to a free society; they are what make the society free.

In a democracy there is need for "critics by profession"—commentators, columnists, etc., whose "beat" is the whole of the social scene—but there is also need of "lay critics" who look upon discovery and publication of truth as part of their civic responsibility. The critic who makes himself an expert on some particular subject, so that he may offer the people information not otherwise available, ought surely to be able to count the people on his side. But, all too often, habits of conformity and mistrust of iconoclasts lead the public to take a neutral position, as if they were judging a proceeding in a court of law.

It is a sad comment on the decline of individualism in America that the critic has no friend at court. He is tagged "controversial," the worst that can happen to anyone in a conformist society. The "controversial" tag makes him by definition a "flawed" personality, non-group-adjusted, one-sided, ill-informed, frustrated, and motivated by ill will. Epithets may therefore be thrown at him with impunity; he may be misquoted and misrepresented, and what he says may be contemptuously dismissed as requiring no refutation whatever.

A second major threat to individual freedom comes from the impact of technology. The utilization of science for practical purposes has such enormous potential for the good or evil of man and society that our attitude toward it requires careful rethinking. We have here a complex problem that calls for a higher order of intelligence than has so far been applied. Up to now we have left technological matters almost entirely to the management of practical men. I submit, however, that the practical approach to a new scientific discovery is short-range and private; it is concerned with ways to put a discovery to use in the most economical and efficient manner. The scholarly approach—if I may use this term—is long-range and public; it looks to the effects which the use of a new discovery may have on people in general, on the nation, perhaps on the world; and it considers the future as well as the present.

As an engineer, I have a healthy respect for the categorical imperatives of nature; imperatives constantly being disregarded for the sake of short-range benefits. I feel strongly that technology must not be raised to the status of an end in itself, but must always remain a means to an end, the end being the welfare of human beings and of the nation as a whole. In determining whether a given technology conforms to this objective, we need the help of both practical and scholarly experts. But the final decision must rest with the American people.

It disturbs me that we allow ourselves to be pressured by purveyors of technology into permitting so-called technical "progress" to alter our lives without attempting to control this development—almost as if technology were an irrepressible force of nature to which we must meekly submit. If we but paused to reflect before acting, we should note that much which is hailed as progress contributes little or nothing to human happiness. Everything new is not eo ipso good and everything old inferior.

Technology does not automatically render obsolete the principles we found good in the past; they belong to a different order of things. Technology is not concerned with them. Principles have to do with the way we marshal our inner resources, discipline our actions, and respond to the promptings of our conscience; with the ordering of our personal lives and of our relations with fellow citizens, both in private and in public life. They apply to human beings.

Technology, on the other hand, deals with material things. Technology can enlarge our powers of mind and body. With it we can improve health, produce material abundance, leisure and comfort, circle the earth with instant communications, etc. But technology does not dictate either the manner in which we put it to use or the specific benefits we want to derive from it.

I suggest we reject the notion that man is no longer master of his own and of his society's destiny. Let us put man back in the center of the stage and do some hard thinking about the kind of life technology is currently creating for us. Only recently, for example, have we begun to realize that careless use of dangerous pesticides and weed killers may poison soil, vegetation, animals and humans. And it took the tragic case of the European thalidomide babies to dramatize the fatal consequences that may result from the hasty use of inadequately tested drugs.

A third threat to individual freedom has been the tremendous increase in the country's population, with all the attendant changes that this has brought. From 1800 to 1850 our population quintupled; from 1850 to 1900 it tripled; from 1900 to 1950 it doubled. Natural increase had as much to do with this growth as immigration. Since World War II the growth rate has accelerated so much that when the time comes to celebrate our bicentenary each citizen will have but one percent of the voting power which individual Americans had in our first national election. A healthy infant born on that day can expect within his lifetime to see our population soar immensely—unless we ponder the consequences to the quality of American life and reverse the trend.

Space of itself bestows freedom and dignity; it gives man elbowroom and a chance to find peace and quiet and privacy. When men are scarce each individual becomes important. Today seven out of ten Americans live in crowded cities, suburbs, and other urban areas, and the country as a whole is more populous per square mile than was Europe at the time of our Revolution. It is hard to find quiet and privacy and a spot of unspoiled nature within reach of home. Man-made ugliness presses on the human spirit, and there is no place for our children to play in safety.

As long as a wilderness had to be subdued there was work in abundance, work of a kind that ordinary men with willing hearts and hands could do; vitally needed work that bestowed dignity on the workman. We were a country of independent farmers, artisans and merchants in those days. Now, nine out of ten Americans work for others; many for giant organizations where they have little opportunity to feel individually important. Today, moreover, our society is plagued with endemic unemployment, a condition under which it is difficult to hold fast to a sense of human worth. The loss falls most heavily on those—and, alas, there are all too many—who lack the skill and education for which there is demand in a complex modern society. In the past, America offered unique opportunities for social advancement to average men with average competence; today this is less and less true. America once offered steady employment even to men of below-average ability, but job opportunities for them have contracted drastically. Ours is still a land of opportunity, but increasingly so only for the highly skilled and educated.

With the disappearance of preindustrial, rural America we lost a way of life that was congenial to individual freedom and democracy. Life was simple, Ordinary men could understand the world they lived in; they could manage their affairs without much trouble; they could reach independent decisions on public issues that concerned them as citizens of a democracy. The individual is diminished when he cannot comprehend the problems besetting his nation. I myself think that if we had a first-rate school system, stressing basic education in the liberal arts, many more Americans than now would understand and express their views on public issues.

Serious as is the loss of these natural advantages, however, it need not be fatal to individual freedom or to preservation of a free society. Many of the most civilized modern European countries never had these advantages, yet they were able to evolve out of feudalism and capitalist monarchy into democratic nations where individual freedom is at least as well protected as here—and in some cases better protected. What we need is a new perspective: a recognition that we must now take positive action to create "artificially" the climate in which the autonomous individual and the free society can prosper.

A fourth major threat to individual freedom is the rise of giant organizations which interpose themselves between the citizen and his government. When the nation was founded we did not even have political parties, and there were only seven commercial corporations in all the colonies. We had no labor unions, no vocational or professional associations, no special-interest groups or huge government bureaucracies. The citizen faced his government directly—whether local, state or federal. With his fellow citizens he shared control over his government on a basis of complete equality.

Today the citizen's wishes may be thwarted if they conflict with the interests of powerful organizations able to bring their immense resources to bear on government. Many organizations have been successful in preventing governmental action they consider harmful to their interests, or in obtaining special government benefits and privileges not vouchsafed ordinary citizens. When society is dominated by powerful organizations, the autonomy of the individual is diminished.

Of course, the right to associate with others for the purpose of engaging in joint enterprises is itself an important part of individual freedom. In a huge, populous, technically advanced country such as ours both private and public organizations are indispensable. Enormous good flows from them. Many organizations, furthermore, are exclusively concerned with serving their members and do not seek to influence anyone; others are small and therefore a threat to no one; not a few are big and powerful but exemplary in behavior and performance. These do not concern us here. What does concern us is the threat to individual freedom posed by huge power complexes which dominate our lives but over which we are not able to exercise control. Among these are both public and private organizations.

Large government bureaucracies are as indispensable to modern society as are large private organizations. Many government tasks have to be entrusted to special agencies set up for this purpose. Yet, although they are a part of government, the citizen's influence on them is not as effective as it is on the elected branches of government; nor are the men who run these bureaucracies as accessible to citizens who have legitimate business with them as are elected government officials.

Many large nongovernmental organizations also tend to misuse their power in relations with the public and the government, as when they seek to hold up necessary legislation favored by the electorate or win special favors as a result of past political support—or through the threat of future retaliation at the polls. In some cases, moreover, these organizations develop an autocratic structure which diminishes the freedom and dignity of employees or members, either by needlessly circumscribing their working—and occasionally even their private—lives, or by failing to be responsive to their best interests. Often those "faults of bigness," as one might call them, are not essential to the purposes of the organization or even relevant to their specific tasks. Once we recognize what makes large organization a danger to freedom, we can deal with the problem without interfering with their lawful pursuits. In fact, protection of individual freedoms will benefit any honest organization, since it releases private initiative, one of the great powers for good inherent in a free society.

Organizations act through men. In our country, they act through a special category of career men, called managers or administrators. The 18th-century French statesman Mirabeau once remarked that "to administer... is to rule." One might expand this to say that administration is a type of authoritarian rule with no constituency and no direct popular mandate. As such it is an anomaly in a democratic society.

In nearly all our large organizations administration stands apart and above production. The men who do the real work of the organization are placed below the administrators who rule them. Administrators may or may not have competence in the organization's special field of work; often they do. Unhappily they often do not. Take education: Clearly the teachers do all the productive work, but it is not they who manage the educational enterprise in this country. Teachers are bossed by administrators who frequently have not been trained in teaching but only in management of the school's housekeeping, personnel and public-relations chores.

The larger an organization, the more powerful are the managers or administrators. Their source of power comes from being in charge of housekeeping matters, hence of the purse, and so in turn of personnel selection and promotion. As with all rulers, the larger the realm, the more important and better paid are its administrators. This makes them empire builders. It also accounts for a tendency to authoritarianism. Orders flow downward freely, but suggestions rarely rise upward in the hierarchy. This is probably more true of public than of private organizations.

Nevertheless, the individual who must work in a large organization, whether private or public, meets conditions of inequality not found elsewhere in our democratic society. Nor is this inequality necessarily a result of unequal human qualities; it comes because one party has behind him the power of the organization and uses it to prevail over the other. This reminds one uncomfortably of the special rights and privileges which once were enjoyed by men for no other reason than membership in a higher estate—as when society was divided into the nobility, the clergy and the third estate.

There is yet another way in which large organizations tend to diminish the freedom of the individual. The Founding Fathers sought to secure the "unalienable rights" of man by associating the citizen with the business of governing; that is, by making the consent of the people indispensable to the functioning of government. In order to exercise his public functions, a citizen must be free to make up his own mind on any public issue, to speak out and to solicit the approval of his fellow citizens; in other words, to be active politically.

Freedom in private life is important, for the citizen needs what Socrates called "a private station" when he engages in public activities. More than invasions of privacy, intolerable in a free society, are therefore involved when organizations presume to meddle in their employees' personal lives. Can a man who must submit to organizational regimentation be a fully effective democratic citizen? Will he feel free to engage in active politics if there is doubt in his mind whether the organization he works for, or the union or association to which he belongs, approves?

Many have been concerned over the danger of our becoming a state dominated by pressure groups. It has been proposed that the people be given a special department to look after their interests. This misreads the problem. The Government in all its branches is already set up specifically to look after the people's interests and for no other reason. What we must do, I submit, is find ways to curb the illegitimate powers of large organizations, both public and private. Government bureaucracies should be made more responsive to the wishes of the voters; this means bringing them under closer control of our elective bodies. Nongovernmental organizations—labor unions, professional associations, special-interest groups, and business corporations—ought to be held more strictly to the specific mandates of their charters, as well as to "public policy."

We have allowed the freedom of the individual to shrink while permitting the freedom of the organization to expand to a point where it overshadows human liberties. But this nation was founded for people, not for organizations. We need to remind ourselves that organizations—like technology—are not ends in themselves but means to an end. This end is a good society; a strong nation; human beings who in equal measure are assured the right to "life, liberty and the pursuit of happiness."

I have no simple solutions to offer. There are no simple solutions for any of the problems which urgently require our attention today. We can approach these problems from many different angles. I approach them from the point of view that individual freedom must be preserved.

Fortunately, there are now signs that give one hope we have passed the nadir and are slowly ascending toward the more rugged individualism that was so marked a characteristic of earlier Americans. Recent events have administered a shock to our self-esteem and have led us to throw ourselves into an earnest search for flaws in our way of life. I am convinced that once the American people have been shown at what points individual freedom has been weakened, they will speedily reinforce these points.

We will be able to do this all the better if we can overcome a general tendency to think of ourselves as unique. A good deal of not wholly disinterested propaganda comes our way seeking to convince us that all the good things of the life we associate with American democracy are uniquely ours. There was a time when life in this country differed greatly from life in other Western nations. For more than one hundred years we were the model of the free society. But ideas have been moving back and forth across the Atlantic, leaving deposits on both shores. Democracy as a form of government has long since become the Western—not solely the American—way of life. It is well also to remember that its roots go back 2,500 years to Greece, and that in evolving the concept of the equal worth of all men every Western nation has played a part.

The greatest glory of Western civilization is that it alone, on its own, came to accept the idea that man as man, individual man, regardless of his particular attributes or possessions, is "the measure of all things" (Protagoras). Since the political corollary of this idea is democratic government, it is not surprising that democracy, too, is a uniquely Western invention.

There is, to be sure, a so-called "Eastern" concept of democracy: pure Marxist double-talk, of course. It defines democracy as government of the people, on behalf of the people, and in the interest of the people.

In areas of the world where the individual has never been held in high esteem, where he derives his status and rights from membership in some group—family, tribe, church, etc.—this parody of Lincoln's famous words is sometimes actually taken as a species of democracy. In a negative way, this illustrates the point I wish to make crystal-clear: Respect for individual freedom, for the autonomous individual, is the foundation of a free society. As soon as you think in terms of "groups," the foundation begins to erode.

Today, the true democracies all face similar problems. All are seeking to solve them through the democratic process, and each can learn something from the others without being untrue to itself. There is, I believe, an irresistible trend toward changing government from the "night watchman" to the "service agency" type. Americans could learn something from the way this transition is being made in the most successful of European democracies. Their reasons have been practical, not ideological. What they have recognized and accepted is that modern life is now so complex, so dependent on careful dovetailing of innumerable human activities, that the individual is in greater need than ever of protection by the law against being harmed by his fellow citizens. There can be no valid objection in principle against making necessary changes. The Declaration of Independence states that "it is the right of the people" to alter the powers of government in such a way "as to them shall seem most likely to effect their safety and happiness."

A friendly though critical visitor to our country once remarked that "there is nothing wrong with America that Americans cannot set right." We can, if we will, strengthen the autonomous individual in our free society. In so doing we will make our nation not only stronger and more flexible, but also a better place to live.

Speech given at Northwestern University, Evanston, Illinois, 2 December 1953

ENGINEERING OPPORTUNITIES

During the past 15 years I have interviewed about 1,000 engineers for employment. Most were recent college graduates. Because the engineers were to work in my own organization and because I well knew that selection and training of personnel is the most important function of an administrator, , I devoted considerable time to this problem. If one chooses the right people, there is little else to do.

To put it another way: Everything in the world must be done through and by people.

What I will say tonight about engineers and about education is what I have learned to look for in young men who aspire to successful careers.

I will begin with specific points because these are more easily understood. Later, when I branch off into the generalities you can say to yourselves: "He is now philosophizing and telling us what is wrong with the younger generation. He is telling us, with hindsight, not to do what he did."

You will be perfectly right in feeling this way, and you will be proving the well known fact that each generation learns only from its own mistakes.

Some of us in the older generation wistfully hope that this need not be so - that you who follow us will learn a little from our mistakes. It has been said that the art of statesmanship consists more in stopping bad things from happening, than in doing good things. If I succeed in stopping one or two of you from doing bad things, I may still qualify as a statesman.

My first specific criticism is that young men are looking for security in terms of money, rather than opportunity to improve themselves and develop their capabilities. This is a strange phenomena , indeed, at a time when the standard of living in the U.S. is higher than it has been anywhere, at any time in history. Today, when no one need suffer from privatations of hunger, or from lack of clothing or shelter, the desire for security in terms of salary, seems to be growing. Now, I can understand this attitude in a workingman, who has no other assets than his hands or his tools, but I cannot understand it in young men who, by means of a university education, profess to be an elite - on whom society has devoted much training, so that they might assume the role of leaders.

This desire for security generally manifests itself in accepting positions, on graduation, where the highest starting salary can be obtained. This is a recent development and has two main causes — one, the large increase in the number of engineers required by industry - from one engineer for every 250 employees in 1900 to 1 for every 60 in 1951. These figures are the average for all industry. In the electrical industry, however, there is now 1 engineer for every 20 employees - and with no saturation point in sight.

This situation has been aggravated by the large sums of money spent on research and development in recent years by the Federal Government, particularly since the start of the Korean War.

Two: the engineering schools have not been graduating a sufficient number of engineers to take care of these needs. There is today a shortage of about 30,000 engineers and it will likely be many years before the supply is equal to the demand.

This has placed the young graduate in the position of having great choice in seeking employment, and has led to a situation known as "the granting of interviews" by students about to graduate.

The second reason for the high salaries that are available is brought about by the fact that many companies today have government contracts for which they are reimbursed essentially on a cost plus a fixed fee basis. This permits them to hire large numbers of engineers at inflated salaries - since the government directly or indirectly pays the entire cost.

For these reasons you must not feel that, upon graduation, when your abilities can not really be known to your employer, a high salary offer is actually deserved.

Another specific point which has struck me is how poorly read are the vast majority of engineering graduates. A very few have read some good books; some read nothing, and the majority have contented themselves with reading current news periodicals and a few bosom novels.

My own belief is that the importance of reading good books has been stressed too much from the cultural standpoint. Young men and women have been urged to read because they would thereby acquire culture, they would become broadminded, or become better citizens, and so on. In other words it was good for one, as going to church.

Now, let us approach it from a different angle - from the one of acquiring learning. Learning can be acquired in 3 ways: by studying and reading, by listening to and observing others; and by doing things one's self. But the number of years available in a life-time is far too small to acquire learning doing things one's self, or by being told by someone else.

By means of reading it is possible to acquire the experience and learning of many great men in a short time. A book which has required years of sustained effort and the erudition of a great mind can be mastered in a few hours. It is like having the privilege of watching a great brain in operation and picking its choice parts. It offers the ability to multiply ourselves - to live several lives in one.

I could dwell at length on the importance of reading - of its relation to the process of creative thought. I don't know whether Lowes book "The Road to Xanadu" is required reading at Northwestern. I understand it was once at M.I.T. Professor Lowes shows that Coleridge acquired most of his thoughts and phrases for "The Rhyme of the Ancient Mariner" and "Kubla Khan" from the most extensive reading over a period of years - how, through reading and thinking he created a work of art.

Many demands are made on a young man's time in college and afterwards, and he must constantly be judging these demands and saying to himself: Is this a good thing - will this help me to become a better human being - will this lead me to a better understanding of people and of the world I live in? Or is it shallow and evanescent?

I do not mean to imply that one should not enjoy life - but it is possible to enjoy life in a rich manner, rather than in a grubby one.

Another important point is that engineers have learned many facts - but have not learned principles. It is, of course, much easier during a course in calculus or in chemistry to memorize formulas and be able to work many problems. This is particularly the case when a course is difficult and a term exam is in the offing.

What I am now discussing is probably more in the domain and the responsibility of the University.

But it behooves the student to know that principles are more important than facts, and that they are far more difficult to master. But once a principle is learned it becomes part of us and is never lost. The facts we learn are soon forgotten and their meaning changes with time.

My concept of a good engineering course is one in which the student learns the principles of mathematics, of physics, of mechanics, of metallurgy and of chemistry. A thorough understanding of these leads easily into the more practical aspects of mechanical engineering, electrical engineering, chemical engineering, etc.

Engineering Opportunities 2 December 1953

All knowledge and all scientific activity is somehow, somewhere interrelated, and substantial progress in any pursuit demands a wide generalized interest in many fields, not merely in one narrow specialized field.

Through concentrating on a specialty too early in life, a man becomes a kind of useful machine, but not a harmoniously developed personality. It is essential that the student acquire an understanding for, and a lively feeling for values. Otherwise, with his specialized knowledge, he more closely resembles a well-trained dog, than a harmoniously developed person.

It is vital to a valuable education, that independent critical thinking be developed by the young man, a development that is greatly jeopardized by over-burdening with too many and too varied subjects.

When I interview a young man I am not particularly interested in whether he is an electrical, or mechanical, or metallurgical engineer, because to obtain a degree in one of these subjects merely requires about 100 hours of classroom work. What can one really learn about electrical engineering in 100 hours? I call such engineers "Textbook engineers". I use electrical engineering as an example, because many years ago I was awarded a Master's degree in that field - after demonstrating that I could work out a paper design of one or two motors and generators by using a large number of empirical formulas listed in handbooks. I would much rather employ an engineer who had devoted all of his time to learning the principles of electricity - because if he knew these it would be easy for him to learn motor or generator design, or any other kind of design.

Engineering Opportunities   2 December 1953

I do not believe that "practical stuff" should be or can be properly taught in a University. The reason is easy to see. Nearly all college text-books are several years behind current industrial practice. Furthermore, they are written by men who do not have the latest "practical" information, so that they are obsolete even while they are being written.

The employer who wants a "practical" engineering graduate from a university is simply hiring a man who knows how to make the same mistakes which have been made in his plant for the past 10 or 15 years.

If the young engineer is intelligent and enthusiastic, if he is interested in learning, and has enough sense to know that he is bound to be a liability for a year or two in any organization really interested in his welfare - it makes no difference what particular subject he has studied. What counts is: Will he work hard, will he accept responsibility?

Another characteristic I have noted in some young engineers is the desire to be placed in charge of something, or of a group of people. Our social structure is such that people believe that the measure of one's importance is the number of people he supervises. On this basis Einstein is not as important as the foreman of a railroad gang.

Today industry recognizes that a good scientist or a good engineer is worth the same salary as a good administrator, and you will find that there is now just as much opportunity, salarywise in engineering as in administration.

Another characteristic of young engineers is the search for exact answers and the feeling of frustration if an exact answer is not forthcoming. This probably stems from the many years of grammar and high school where the answer is always to be found in the back of the book, and the feeling of elation which comes when, after trying several solutions, and looking furtively at the known answer, the latest trial finally works.

Unfortunately, in real life, there are no exact or final answers. I have for some time thought that a few of the ills of today start from this childish faith in the existence of perfect answers. It requires a degree of maturity to realize that all solutions are partial ones.

When the researches of the Pythagoreans brought them face to face with irrational numbers, they were overwhelmed by the discovery. It contradicted the fundamental tenet of their philosophy that everything is rational.

Just remember that not so very many years ago the correct answer was that the universe consisted of a number of celestial transparent spherical shells in which the stars were fixed - or that the sun revolved about the flat earth. And more recently an eminent physicist stated that all the basic laws of physics were known.

I can sum this up by saying that regularity is abnormal, and that the irregular is always commoner than the regular.

By now you may have come to the conclusion that I have violated my agreement to mention nothing but specific points, and have slyly worked in a few principles.

But as I look around the room and can see no outward evidences of sleeping, I feel warranted to proceed on the basis of principal alone.

Let us consider the question of salary. This, in itself, can never be the most important means for happiness, and it is quite obvious that the wealthiest people in the world are not necessarily the happiest. Of course, if a man goes to a university for the sole purpose of bettering his economic status, the earning of a large salary may appear to him to be the one means to happiness. But I am not addressing myself tonight to men with that limited viewpoint. They have the right to their choice, but they are certainly the beneficiaries of a lower than cost tuition, and they are taking advantage of many instructors and professors who teach because of professional duty, and who could command larger salaries in industry!

The greater opportunities which exist today for the satisfaction of material needs and the growing freedom of action that follows from increasing control of Nature expose us to the danger that we shall regard material comfort as the end of civilization rather than the means to its attainment.

The only way in which these dangers can be avoided in a society which rejects the over-riding authority of a Church or a State is through the existence of a minority of individuals capable of securing, by the respect which their own standards evoke, the adherence of the majority of men to higher standards than those they would create for themselves.

A university must train the most diverse kinds of people for a wide variety of future careers. Many of them are potential leaders in various fields. From the university must come the future under-secretary, the politician, the scientist, the surgeon, the teacher, the man of business, and the editor.

How, then, does one achieve success in a profession.

Only in exceptional cases is success, as commonly known, the result of skill, and of certain other human qualities like honesty, decency, and integrity. Although the proportion between skill and human qualities on the one hand, and "personality" on the other hand, as prerequisites for success varies, — the "personality" factor always plays a decisive role.

Success, in this sense, depends largely on how well a person sells himself, how well he gets his personality across, whether he is "cheerful", sound, aggressive, reliable, ambitious, — furthermore what his family background is, what clubs he belongs to, and whether he has the respect of people.

The fact that in order to have "success" it is not sufficient to have the skill and equipment for performing a given task, but that we must be able to "put across" one's personality in competition with many others — shapes the attitude towards one's self.

If it were enough for the purpose of making a living to rely on what one knows and what one can do by himself, esteem would be in proportion to one's capacities. But since success depends largely on how one sells one's personality, we experience one's self as a commodity.

A person is not concerned with his life and happiness, but with becoming saleable.

Many of you will soon be faced with making a choice. Remember that your choice of where you will work and for whom you work is far more important than the starting salary. What you have learned so far is but a small part of what you must know if you are to become competent in your chosen field. The first few years after graduation will largely shape your future.

Several days ago I asked a number of young engineers who are working with me to express their views on this subject. A number of these men took reductions in salary to work where they now are. You may be interested in knowing that every one of them independently arrived at these same conclusions.

THIS SPEECH REFLECTS THE VIEWS OF THE
AUTHOR AND DOES NOT NECESSARILY REFLECT
THE VIEWS OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

FOR RELEASE 6:00 P. M.
MONDAY, JANUARY 16, 1967

FREEDOM AND THE KNOWLEDGE GAP

by
Vice Admiral H. G. Rickover, U. S. Navy
upon accepting the
Franklin Medal for Distinguished Service
presented by the
Printing Industries of Metropolitan New York, Inc.
New York, New York
Monday, January 16, 1967

It is an honor to receive this award and a great pleasure to be here, especially since the occasion for our coming together is the 261st anniversary of the birth of Benjamin Franklin.

We could celebrate this event in a number of ways. The most satisfying would be to reconstruct Franklin's life. It has great appeal because it confirms our faith in America. Here is the success story we like to think of as typical: the poor boy who gets rich, who rises from humble beginnings to fame and to enjoyment of the company of the great--all of it through personal effort, with no outside help. So versatile a man was he that in Franklin's life each of us can find the success story that is his own particular American Dream. I myself like best his self-education through voracious reading. It vindicates my belief that anyone who is able to read and has access to books can acquire a liberal education. Conversely, that it is a matter of personal choice if he remains uneducated.

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Franklin often said he could not remember a time when he did not read. Books were his teachers. Taking the best authors as his models, he worked hard at perfecting his writing, eventually achieving a simple, lucid style. His thirst for knowledge never ceased. He taught himself foreign languages so he could read foreign books; he taught himself science so he could understand the world of science that was just opening up. He read not only for instruction but for enjoyment as well.

All his life, men of learning and position who ordinarily would not bother with an artisan, sought his company. He thought it was because "reading had so improved my mind that my conversation was valued." America's first ambassador to a major power, Franklin's reputation in Europe as a practical scientist and political philosopher was a major factor in the success of his mission. Ultimately the force and charm of his personality won French financial and military support for the American Revolution, thus ensuring its eventual triumph. But Franklin's greatest achievement was the man he made of himself. He was a man, said Mark Van Doren, who "dignified and glorified his country."

Pleasant as it is to relive the life of a great American, and in the doing to feel uplifted oneself, I shall pursue this subject no further. I am no authority on Franklin. Most of you know more about him than I. In any event, I think commemorative observances should in a more general way involve a confrontation of the present with the past. They should be occasions when we contrast the actuality of our present way of life with the promise of our heritage; or, alternatively, when we re-examine our heritage in the hope of finding guidelines that may help us solve currently intractable problems.

I shall try to do this. But, given the dimension of the subject and the limited time at my disposal, my attempt must be brief and sketchy. Still, I believe this could be of some value since we tend to immerse ourselves in current problems without considering them in their historic perspective.

To an unusual degree, we are a people preoccupied with the present and indifferent to the past, convinced as we are that everything we do, everything we possess is the best the world has ever seen. We feel superior to those who lived before us; the past has little relevance for us.

George Bancroft, America's foremost 19th century historian, once remarked that "the people of the United States will by degrees learn that theirs is a history worth knowing." Since his time a vast amount of original documentation has been made available in readable form. We have first-rate historians and they write excellent books. Quite possibly, we know more now about American history than in Bancroft's time. But it remains something of an academic exercise because we have not made it part of our way of thinking, our way of looking at the world. We do not feel in our very bones that what Americans thought and created in the past has a value of its own, worth preserving even when it is not measurable by present day yardsticks of efficiency or profitability.

One can but hope that our habit of equating "old" with "obsolete" and "new" with "best" will in time disappear, responding to that sovereign remedy Oliver Wendell Holmes was so fond of prescribing for all the ills of the world. As you probably remember, it was "to grow a little more civilized."

Civilization is a word with many connotations. One is that it creates inheritable wealth in man-made things of lasting beauty and utility; another that it develops discrimination in judging the value of these things to modern man. If one were asked what chiefly distinguishes people in old countries from those living in countries we call "new" or "young," the answer, I think, would be their attitude toward the past. This difference in outlook--rather than technical backwardness, as we like to think--accounts for the different "look" of old countries and, incidentally, explains why the tourist traffic across the Atlantic runs mostly one way--a constant drain on our gold reserves.

I did not myself fully realize how much the present can be indebted to the past until I saw this demonstrated in simple, concrete form on a visit to Switzerland. Driving up a winding road, past terraced vineyards reaching to the very top of the mountain, it suddenly struck me that all the work of terracing had been done by hands long since turned to dust; that it was the labor of those hands that made the steep mountain slopes fruitful, thus, quite literally, "giving" the modern vine grower his means of livelihood.

Once this obvious phenomenon had revealed itself to me, I saw how everywhere abroad it forges a link between the generations, binding the present to the past and to the future as well. Along the Mediterranean you can see olive groves whose retaining walls were built in Roman times--2,000 years ago. You can also see endless columns of newly planted trees marching across the arid hillsides--in every size from seedling to full-grown oak, olive or cork tree --today's contribution to the future. Over most of Europe, centuries of cultivation have not impaired fertility of the soil. Every farmer is beneficiary of the careful husbandry practiced by his forebears. Though population growth and technology have left their scars, the greater part of the landscape still retains the attractive ancient pattern of family farms with alternating fields and woods. Aerial surveys reveal that the outlines of English farms at the time of Doomsday Book often coincide with those of the modern farms.

Europe is full of old houses, old villages, old towns that are pleasing to the eye and attract tourists by the millions. Many are now protected as national monuments. Not immaculate museums like Williamsburg but places that have been made habitable for modern man without altering their appearance; where people live surrounded by things of beauty that have come to them from the past. I should like to see this idea adopted here, before every vestige of an earlier America has fallen victim to that most destructive of modern contrivances, the bulldozer.

On my frequent flights across our country I see bigger gashes each year, deeper wounds in the good earth of America; more pits and slag heaps where the soil has been mined and desolation left behind; more trees, topsoil and buildings ripped out to make room for the steel and asphalt world of tomorrow. For us no vineyard, orange grove or family farm has value if more money can be made by putting up factories, housing developments, parking areas. The engineers, armed with their sacrosanct blueprints cannot be stopped. Wherever it has been decided--probably by a computer--that a highway must go, there it will be driven arrow straight across the land. No matter that it destroys a landmark dear to many people, or cuts through a charming old town where something of our past has been carefully preserved by the inhabitants, or despoils a park deeded to the public "in perpetuity."

It isn't fair, of course, to blame the engineers. They are merely doing their job. There is no public outcry against them. The only voices raised in protest are those of people who are personally hurt, and of a small minority of citizens who cannot bear to sit idly by watching God's own country being turned into "God's own junkyard." Until this minority grows into a majority, determined to preserve what is left of the beauty of our land, the destruction will not cease. Each year another million acres will disappear from our store of productive land, to go into suburbs and add a further dimension to megalopolis.

Indifference to the past breeds irresponsibility toward the future. We rarely consider the consequences of our actions for future generations of Americans. We certainly did not think of them when we proceeded to cover the countryside with those endless strips of formless urban masses we call conurbation. Whatever adults may think of them as places of human habitation, they are not good places for children to grow up in.

All children are, of course, born into a world they never made, and must manage to adjust to the physical environment and style of life created by adults pursuing adult objectives. But children will develop better if their basic needs are included in these adult objectives. In countries that have retained a tradition of fitting man-made structures into the natural landscape without marring it, children's eyes grow accustomed to seeing man and nature in harmony. Few of our children have that chance today. All too many grow up surrounded by man-made ugliness, with no terrain to romp on that has not been soiled by the sticky fingers of adults Rarely, if ever, is it possible for them to be in intimate contact with nature. Does this not have adverse effects upon them? Will they not be even further alienated from nature than we are?

Our amazing capacity to change the contour of a continent is matched by the thoroughness and rapidity with which we have transformed our social geography. You doubtless remember Franklin's description of America in 1782. A country without extremes of poverty or wealth, but with "a general happy Mediocrity"; with "few great Proprietors of the Soil, and few Tenants"; where "most People cultivate their own Lands, or follow some Handicraft or Merchandise," and few are "rich enough to live idly upon their Rents or Incomes." Where land is so abundant that a hundred acres can be bought for "eight or ten guineas," and men are so scarce and therefore needed and valued that this sum can be saved in a short time by any laborer, wages being higher here than anywhere else.

For one more century this description remained true. Millions of landless peasants and poor cityfolk came to America and found the ultimate goal of their dreams: a farm of their own, a business of their own. But nearly everything that made Franklin's America a Utopia for ordinary men, with courage and the will to work and not much else, has now turned into its opposite.

We are no longer a nation of independent farmers, artisans, merchants or small businessmen; 90 per cent of us are employed by others, more often than not by huge organizations in which we are tiny, interchangeable cogs. Paradoxically, there are now more family farms abroad than here; there are more landlords operating large farms with machines and migrant labor here than in Europe. Where once we had neither paupers nor very rich men, we now have both. The richest one per cent own 28 per cent of the national wealth, the poorest one tenth own one per cent. We who once lived in wide open spaces, with only five per cent in towns of over 8,000 inhabitants, are now crowded into cities and suburbs--70 per cent of us, and the number keeps growing. What was once a wilderness hardly touched by man is now the most completely man-made land on earth. Access to unspoiled nature is so difficult that it's simpler to fly to Switzerland if one craves to sit on a mountain top.

It is tempting to speculate whether Franklin or any of the Founding Fathers would have approved the changes we have wrought in the nation they helped to bring into being. That these changes have made us the wealthiest and most powerful state on earth would be of less interest to them, I think, than whether we had preserved intact our liberties.

Wealth and power were not aims of our Revolution. Unlike some later revolutions, ours was fought on the single issue of freedom to manage our own affairs as a nation and as individuals. No one imagined that the end of colonial rule would bring instant riches; nor did any of our leaders give thought to personal emolument or high office for himself should the war be won. Their passionate concern was national independence and individual liberty. They risked their lives and fortunes and gave the best that was in them to the building of an effective political framework for a truly free society.

We have been wise enough to hold on to this framework, despite our proclivity for throwing everything old overboard. The Declaration of Independence still proclaims the basic tenets of our political creed. The Constitution still provides the institutional mechanism which gives reality to these tenets. True, we have amended the Constitution. We have stretched many of its provisions to their utmost, in the process weakening the federal structure the Founders regarded as the very bedrock upon which our political system rests. But, though we have moved a long way toward a unitary state, with power centralized in Washington, this of itself has not impaired American democracy, a different matter altogether. Consider that Sweden, a unitary state, is as democratic as Switzerland, a federal union.

Democracy, to the Founders, meant a system combining maximum individual freedom with adequate provision for the proper governance of a civilized society. The Constitution they devised with such consummate skill represented in Hamilton's words, a happy mean between "the energy of government and the security of private rights." It is this "happy mean" which I fear has to some degree been lost in our phenomenal rise to power and wealth.

This rise is the result of two major revolutions in the technique of living: the industrial revolution which came to us from Europe in mid-19th century and the scientific revolution which arrived here a century later. Both revolutions have been of great benefit, but they have also caused much harm. Modern science-based technology, in particular, poses a serious threat unless it is kept under social control. In a democracy, such control can come only through laws demanded by the electorate. This presupposes a lay public which understands enough of technology to determine where it causes injury and how this can be prevented.

But science--so important to the comprehension of modern technology--is for the majority of citizens a closed book. There is a knowledge gap of vast dimension between the public and that small elite of highly intelligent, highly educated experts who understand science and have the use of technology. Disturbing as it is that people should differ so greatly in their grasp of a vital area of knowledge, the phenomenon is not unusual. It occurs with every major rise in civilization.

Men are the most unequal of all species on earth. They are more unequal in realms of the mind than in physical characteristics. The higher the level of civilization, the more important does mental power become for, as Gilbert Highet reminds us, "civilization is not chiefly concerned with money, or power, or possessions. It is concerned with the human mind."

But the opportunity to cultivate mind and spirit--the essence of civilization--is not seized with equal avidity by all men. Always and everywhere, civilization results in greater enlargement of the scope of human thought and action among a minority possessing high intelligence than among the majority. It follows that, although men become more equal in material possessions as civilization advances, in knowledge and in competence they become less equal.

For complete equality we must go to the animals. In their native habitat they are uniformly handsome and differ but slightly in physical prowess--just enough to vest leadership in the strongest, thus enhancing the group's capacity to survive. Some human societies at very early stages of development are almost as equal as are animal societies, no one having yet attained sufficient power to compel others to serve his purposes. There is peace within such egalitarian societies--a goal we still pursue in vain. Animals, in particular, rarely kill or even seriously wound members of their own species. There is peace and equality but nothing else except mere survival.

Much as we dislike the idea, it looks as though inequality has throughout history been inseparable from civilization. Perhaps this is why civilized men in all ages have longed for the "simple life," be it in a rural Arcadia, a South Sea island, a frontier settlement. But as we dream of equality it recedes ever further beyond the horizon. We come no closer than political and legal equality, for these can be prescribed regardless of differences in knowledge and competence.

When life is simple, it can be understood by nearly everyone, and the capacity to function effectively is within the grasp of all. With civilization, life grows complex, harder for ordinary people to understand, demanding skills many are unable to acquire. In understanding and in competence, the gifted forge swiftly ahead. What they achieve is beyond the capacity of the average. As a result, men grow apart, their interests diverge. Society then divides into segments according to superiority of competence or superiority of numbers. Each segment may be tempted to impose its own will on society. In the past, it was possible for either side to predominate. Today the advantage is decisively with the side that has superior knowledge and competence.

We are marching with giant strides into a future where the competent become indispensable to the very survival of society, while the incompetent become redundant. Large numbers of people will find themselves displaced by machines which can do their work better and cheaper. It will take all the moral resources we possess to keep ours a humane society based on respect for the worth of every human being. It will take all our intelligence and political acumen to keep ours a free society, preserving individual liberty and the moral and social values cherished by free men.

In our predicament, it may be wise to heed the Pennsylvania State Constitution of 1776 which declares that "a frequent recurrence to fundamental principles" is "absolutely necessary to preserve the blessings of liberty and keep government free."

We face a new version of an age-old problem which was of particular interest to the men of the Enlightenment. During that last phase of the Renaissance, political thinkers here and abroad were inspired by classical rationalism to mount an attack on every custom and institution that shackles the mind of man and arbitrarily restrains his actions--from superstition to class privilege, from tyranny by an established church to tyranny by a secular autocrat. The great achievement of our Founding Fathers was that they discovered a practical answer to the central question of the time: How to limit power so men could be free?

They saw clearly that the problem reflected an inherent conflict between civilization and liberty, for it was life in civilized society that generated the power which then suppressed the liberties of the individual. Civilization, of course, takes on different forms, constantly creating new centers of power. But the fundamental principles adopted by the Founders for the governance of this nation will continue to safeguard our liberties if we adapt them to altered circumstances. Two of these principles are particularly useful for dealing with problems caused by the knowledge gap between experts and lay public. They are first, that sovereignty is vested in the people, and second, that right and duty are correlative.

The first principle places public officials in the relation of agent to principal, thus making them accountable to the electorate. To make this principle fully effective, we must take steps to eliminate campaign costs as a factor in choosing candidates and electing men to public office. I hope everyone will take advantage of the recent law which permits taxpayers to assign one dollar of their taxes to a fund for presidential campaign expenses.

This novel and imaginative method of socializing the cost of election campaigns should be expanded to cover congressional elections as well. This would give us a wider choice of candidates. Those elected would not be beholden to any man or group for campaign contributions. I have never met a legislator who did not resent such obligations; who would not have preferred to be accountable solely to the people who elected him. By freeing our elected representatives, legislation demanded by the people for protection against injurious technologies and for preserving our heritage would have easier passage, as would laws providing for action to undo the enormous harm technology has already caused--such as pollution of air and water.

The second principle holds that the influence each citizen exercises over his government correlates with his duty to place the common good, the public interest above his own private interest and above the interests of groups with whom he identifies himself. It holds that the right to an equal vote correlates with the citizen's duty to make himself sufficiently competent to exercise this right responsibly.

The Founders saw more clearly than we that democracy cannot succeed unless a majority of the people possess what the ancients called the "public virtues." We sometimes forget how dangerous an experiment democrac appeared to 18th century men. The framers of the Constitution thought and wrote extensively on the difficult art of self-government. They risked it only because of their certainty that Americans could be trusted to make a success of it since they were frugal, self-reliant people and--as independent entrepreneurs--had practical experience in managing affairs. They felt that Americans developed the "public virtues" so to speak automatically, because of the kind of life they led and the way they earned their livelihood.

This is no longer true. Work as "organization men," in particular, is not apt to promote the qualities the Founders had in mind. But even if we all still had our own farms or shops, the practical experience gained from managing one's own business would no longer suffice for the competence a citizen must have today. The issues we face have grown infinitely more complex since Franklin's day. To understand and cope with them calls for the application of informed intelligence--a skill that has to be learned at school or through systematic self-education.

A century ago, Robert Lowe addressing the House of Commons spoke of the "absolute necessity of educating our masters." Suffrage had just been expanded in England and he, like others, feared an ignorant electorate. The thought that democracy requires free public schooling was novel then, but everyone everywhere has absorbed it by now. The obverse, however, that citizens in a democracy have a duty to become educated is not yet understood, especially among the least educated who see schooling as something to be demanded but not necessarily utilized.

Yet it should be obvious that, at the American level of technology and civilization, our young people cannot become contributing members of their society--as breadwinners or as voters--unless they absorb a substantial mass of solid knowledge. Whether children like to learn the academic basics, or whether their background has given them an appreciation of the value of these subjects is irrelevant. The blunt truth is that unless they work as hard as they can to become as educated as their innate capacities allow, they will jeopardize the liberties of us all. These liberties are safe only as long as we have a viable democracy.

No one has a greater stake in democracy than the least competent of our citizens, for only in a democracy are individuals respected and granted rights whether their contributions are essential to society or not. An affluent society can bear the burden of supporting out of public funds those who lack the skills that will gain them a livelihood. But a free society cannot, in the long run, bear the burden of having a mass of voters who lack the education they need to make them responsible citizens. Education is the fundamental premise of a democratic society. Clearly then, it is not enough to provide the fullest educational opportunities for everyone; these opportunities must also be used by everyone.

Even the best education cannot give the public more than a key to specialized knowledge--enough background to read books dealing with specialized knowledge. The leisure that modern technology makes available to ever larger numbers of citizens could not be better spent than in this type of self-education--the way Franklin learned his science. It is not necessary to be able to follow scholars into the realms of higher mathematics or science in order to be able to judge the effects of technology on man and on society. There is a parallel in lay juries. Without training in law, they are able to determine the innocence or guilt of accused persons.

Permit me to offer a few thoughts on how laymen can deal with technology. I shall have to be didactic for time is running out.

Technology is not a force of nature with its own imperatives, its own momentum, which place it beyond human direction or restraint. It is a human creation, therefore subject to legal restraint if it injures man or society. Nothing could be sillier than to claim that "you cannot stop progress." You can, indeed, and you should if you feel it has adverse effects.

Though modern technology is based on science, the two must not be confounded. Science is a body of systematized knowledge; technology is the apparatus through which knowledge is put to practical use. Whatever the scientific community accepts as proven is not open to public debate. This is one lesson mankind has learned. No one disputes that the earth circles the sun, or that atomic fission produces energy. But technology cannot claim the authority of science. It is therefore properly a subject of debate, not alone by experts but by the public as well.

Science, being pure thought, harms no one. Technology, on the other hand, is action, often potentially dangerous action. How we use technology profoundly affects the shape of our society, the quality of our life. In the brief span of time--a century or so--that we have had a science-based technology, what use have we made of it? We have multiplied inordinately; we have wasted irreplaceable fuels and minerals; we have poisoned air and water; we have perpetrated incalculable and irreversible ecological damage. On the strength of our knowledge of nature, we have set ourselves above nature. We presume to change the natural environment for all the living creatures on this earth. Do we, who are transients on this earth and not overly wise, really believe we have the right to upset the order of nature, an order established by a power higher than man?

Experience shows that by itself the legal maxim of the "mutuality of liberty" will not prevent the use of harmful technologies. We need laws that proscribe technologies which may injure health or cause the death of human beings. The term health should not be limited to physical health but must include psychic health and protection of the human personality. New technologies based on the uncertain "science" of the social sciences involve snooping into the inner recesses of the human mind, personality testing and pseudo-scientific manipulation of human beings. When they are imposed as conditions of employment or otherwise partake of an element of compulsion, these technologies should be regulated or outlawed entirely.

Much more thought should be given to technological interference with the balance of nature and its consequences for man, present and future. There is need of wider recognition that government has as much a duty to protect the land, the air, the water, the natural environment against technological damage, as it has to protect the country against foreign enemies and the individual against criminals.

These are my suggestions. Others may have better ones to offer. What seems to me of utmost importance is that we never for a moment forget that a free society centers on man. It gives paramount consideration to human rights, interests and needs. Society ceases to be free if a pattern of life develops where technology, not man, becomes central to its purpose. We must not permit this to happen lest the human liberties for which mankind has fought, at so great a cost of effort and sacrifice, will be extinguished.

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PERSONAL ACCOUNTABILITY IN FINANCIAL MANAGEMENT

by
Vice Admiral H. G. Rickover, U.S. Navy
at the
FINANCIAL MANAGEMENT CONFERENCE
Mayflower Hotel
Washington, D.C.
Wednesday, January 31, 1973

I was honored when the Comptroller General extended to me the invitation on behalf of himself, the Secretary of the Treasury, the Chairman of the Civil Service Commission, and the Director of the Office of Management and Budget to address this Conference.

I have been fortunate to know the Comptroller General for many years. He is a dedicated public servant who handles a most difficult job with objectivity and integrity. He exemplifies the maxim: "Goodness civilizes the intelligence."

Although I know that high-minded speechmaking will not solve anything, I hope that my experience of more than 50 years of Government service--30 of which have been spent at the head of large defense programs--may help. For in this time I have encountered many problems which point to the need to improve Government financial management.

Often the problems are recognized and well-publicized, but are condoned on one of the following theories: "it has always been that way," "it is too big a

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problem for me to tackle," "it is not in my job description," "the management wants it that way," or some other pointless and self-serving excuse.

If we do our jobs with determination, each of us can bring about needed improvements in Government financial management. Not to do so is to evade our responsibility as responsible officials and as citizens. Or as Thomas Carlyle wrote: "Do the duty that lies nearest thee."

Although each of you faces problems and pressures, the public nevertheless looks to you to establish discipline in financial undertakings and in accountability for expenditure of funds and performance of work. As the conscience of Government, you are required to sort out solutions from a range of alternatives and to set priorities. Your responsibilities also provide you the opportunity to make a lasting contribution to responsible Government.

All of us know of the public skepticism that is assuming massive proportions--a skepticism based on concern for our institutions and the Government's ability and willingness to keep its house in order. There is also growing awareness of how little control Congress and the executive branch exercise over federal expenditures. Cost overruns, waste and inefficiency, undue industry influence in rule-making and enforcement--all tend to undermine public confidence in Government management of its financial affairs. This loss of confidence has spread to other functions of Government and contributes to disillusionment and to low regard of the federal bureaucracy.

Improving financial management is an important step in the betterment of Government. Knowing what needs to be done is the easy part; getting it done is the challenge. Nor are good ideas automatically adopted; they must be driven into practice with a sense of courageous impatience. And once implemented, they can be easily overturned or subverted through apathy or lack of follow-up. Too often we paper over good issues, not because they do not exist, but because it is comfortable not to face them.

Worthwhile things are rarely accomplished without hard work. In the early days of nuclear power, for example, there was considerable resistance within the Navy to building a nuclear submarine. It was thought that since the state of the art had been adequate for World War II operations, there was no need for such a ship. Only after much frustration and hard work was approval obtained to build the first nuclear submarine--the NAUTILUS. Twelve years after the NAUTILUS went to sea the nuclear submarine had become the mainstay of our nation's strategic deterrent.

Ten years ago I encountered similar apathy and resistance when I pointed to the need for cost accounting standards in defense contracting. Contractors were able to charge costs in almost any way they wished by justifying them under the gimmick of "generally accepted accounting principles." It was virtually impossible for the Government to determine the actual cost of making defense equipment or how much profit contractors were making without spending months reconstructing contractor records.

There was no support in the Department of Defense or elsewhere in the executive branch for establishing cost accounting standards. But despite this apathy and opposition, I kept on, year after year, testifying to Congress about the need for these standards.

In 1968, Congressmen Patman and Gonzales and Senator Proxmire took the initiative and introduced legislation requiring establishment of cost accounting standards for defense contracts. The defense industry, the accounting profession, the Department of Defense and the rest of the executive branch were all opposed. As a result, the legislation finally enacted merely called for the Comptroller General to study the need and feasibility of establishing such standards.

After a two-year study, Mr. Staats reported that standards were feasible and necessary. Then, and only then, was it possible to overcome the opposition. Congress promptly enacted legislation establishing the Cost Accounting Standards Board.

The Board has begun to issue its standards. Although only a small part of the job has been done, these have already had a far-reaching effect. The requirement that defense contractors disclose their cost accounting practices and follow them consistently provides a basis for open and fair dealings with the Government. Even nondefense agencies have now invoked the Board's standards for their negotiated contracts. The idea of setting standards has spread also to the field of financial accounting where the accounting profession recently established a full-time Financial Accounting Standards Board.

Reform does not come easily. In cost accounting it took a tremendous amount of time and determined effort merely to reach the stage where the Comptroller General was asked to look into the problem. Had we listened to the so-called accounting experts or given up during the years when there was no progress, there would still be no Cost Accounting Standards Board.

The great flaw in our system of Government is not the temptation it offers the strong man, but the latitude it allows the weak man to do less than is necessary. Repeatedly I have found deficiencies in the management of Government financial affairs, yet little evidence that those responsible were trying to correct them. Government financial managers are often willing to accept and even adapt to situations they know to be wrong. Their tendency has been to wait for someone else to take action or to seek refuge in the sanctuary of negative consensus.

Take Government accounting practices: I am still unable to rely on the Navy's accounting system for information about the funds for which I am responsible. For this reason I have had to develop my own procedures. Those who have no other means than to rely on data from present systems frequently find themselves working with misinformation. You may have read recently of overexpenditures in appropriations. This was attributed to inadequate financial management and control systems. Yet, to preclude that very situation the 1950 Budget and Accounting Procedures Act provided that agency accounting systems must comply with standards set by the Comptroller General. I understand that the civil agencies have made progress in the last few years. However, today--23 years after the Act was passed--more than 1/3 of their accounting systems have not been approved. In the Department of Defense, which has more accounting systems subject to approval than the rest of the Government combined, 95 percent are still not approved.

The lack of approved and effective accounting systems--so many years after the legal requirement was established by Congress--is a glaring deficiency, and one which has been entirely within the capability of the agencies represented here to correct. If this conference is truly interested in improving financial management in Government, it should resolve, prior to adjournment, to establish, in 1973, approved accounting systems. The Office of Management and Budget could assure this improvement by requiring each agency to show in its annual budget submission whether or not its accounting systems have been approved. In any event, this is a problem that must be corrected without further havering.

For the past several years I have also looked into the Navy's administration and financial management practices at major private shipyards. Nearly all work at these yards is under Government contract awarded with little or no competition. Despite the presence of 300 to 400 Government representatives, including 10 to 20 auditors, at each yard, I found that there was no effective surveillance of contractor financial operations for expenditure of Government funds. There were numerous deficiencies in procurement, cost control, and accounting practices--all contributing to unnecessary high costs. The Government officials responsible for administering these contracts excused their inaction by stating that they were relying on the contractor himself to perform these functions. They used an army of words to justify their static position. Eventually, senior Washington officials intervened and issued instructions to exercise close surveillance of contractor operations. Only after this, was some effort made locally to correct deficiencies.

It is difficult to overcome years of inaction. Many Government representatives are reluctant to identify and raise controversial issues with contractors. Somehow they are blinded by the small amount of effort it takes to isolate oneself from anything that isn't particularly appealing. Some spend more time trying to get people to love them than trying to achieve something. Others, have essentially become clerks instead of professionals; having no convictions, they are slow to speak up because they doubt their ability to defend their position.

Too readily we accept conclusions that contradict common sense. This attitude is not unique to the Navy or to shipyards or, for that matter, to contract administration. Time and again, in all areas of private and public life, poor performance is accepted as the norm.

I have seen some Government agents who represent business interests to the Government with far more eloquence and determination than they use to represent the Government's interests to business. The innocuous documents they write to contractors are no more likely to receive a satisfactory and responsive reply than St. Paul's epistle to the Romans. For my own part I believe it is better to be respected and disliked than to be weak and liked.

Auditing is another area that needs strengthening. A good audit should identify significant items warranting management attention and then suggest a practical solution. However, most audits focus on trivial matters and do not give a representative and accurate view of actual performance. For example, a recent audit of Government contract administration at one shipyard contained 80 recommendations. Only 16 of these related to how well the Government contract administration office was carrying out its primary functions. Sixty-four dealt with internal administrative matters--items of minor importance that, if adopted would not disrupt the normal placid way of doing business.

I mentioned major contract administration deficiencies at shipyards which I myself found and reported to my superiors. Audits made prior to my investigations, including reviews by Navy, Defense Department, and even General Accounting Office auditors, had not revealed the extent of these deficiencies. Although the auditors did uncover significant deficiencies, they did not take the measures necessary to get them corrected. In many cases they believed that their responsibility extended only to reporting the problems, but not for seeing that they were corrected. They took the narrow view that anything not specifically listed in their job description required no action by them.

Much also remains to be done in the procurement area. Defense contractors, including steel companies, computer manufacturers, forging and nickel suppliers, routinely refuse to provide the cost or pricing data required by the Truth in Negotiations Act. Rather than face up to the disagreeable problem of taking on large and recalcitrant companies, some procurement officials maintain their peaceful way of life by simply not enforcing the Act.

Procurement rules need to be rewritten to reflect that competition in defense procurement is the exception, not the rule. The ineffective Renegotiation Board and its cursory renegotiation practices need overhauling to provide a curb on excess profits. The Department of Defense needs a better profit reporting system--one that covers actual profits on all major contracts and subcontracts, not just on cost reimbursement and incentive type prime contracts.

We also need better procedures for discouraging and for defending against unwarranted contractor claims. Because of the small number of Government personnel available to fight the growing number of claims, I have recommended hiring outside legal talent.

Another area requiring improvement, one being considered by this conference, is productivity. The most significant step which could be taken to effect improvement is simply to get each Government official at headquarters and in the field to do his job and look after Government funds as conscientiously as if he were running his own business or spending his own money.

In case after case, the problems I find are consequential to a Government employee not carrying out his assigned responsibility. Too frequently he accepts unbusinesslike situations which he would not tolerate in his personal affairs.

I must also warn about relying on so-called management systems to measure and enhance productivity in the Federal Government. There is a perennial resurgence of interest in various esoteric management systems and concepts intended to measure and improve productivity of Federal employees. Over the years I have seen the introduction of these systems in the Department of Defense and the rest of the Federal Government, as well as in industry. They promise a cheap, easy way to do a difficult job. My experience with these expensive and time-wasting systems is that they do little or nothing to help management identify or solve problems. Rather, their paper-work results delude management with the mirage that problems are being solved when in reality they are not. In fact, the proliferation of management systems within the Department of Defense has contributed significantly to spiraling defense costs and to delays in weapons acquisition.

One program made a reputation for developing a major improvement in management information systems. This innovation was heralded far and wide as a means by which cost and schedules could be controlled. Later investigation disclosed it had not been used by the program itself or by its contractors; that it pretended to indicate that the program was under close control, but that it actually served to prevent outsiders from questioning progress.

The examples I have given illustrate fundamental deficiencies in all financial accounting. There are others I have not touched on. No doubt, you can think of analogous problems in your own areas of competence. The essential point is that each of you should recognize your responsibility, not only to find the problems, but also to correct them. You must start placing this responsibility before other obligations; before personal ambition or comfort.

One often hears the phrase "I am not responsible." This has become a standard response in our society to complaints of a breakdown in a system. The person using the excuse actually means "I cannot be held legally liable." But I see it another way. The man who takes such a stand is truly not responsible; in other words, he is irresponsible.

As a financial manager, there are three questions you should ask yourself:

First, "Would I do this if I were spending my own money?"

Second, "Given the need, is there a better way to do it?"

Third, "Am I working for the U. S. Government or for industry?"

Financial management is a good place to start in restoring public confidence in Government. It does not require a great deal of insight to see the problems. But it takes willingness, indeed determination, to try to solve them. In this regard, even one individual can set an example which can result in a far-reaching benefit. In the process, the individual himself will discover the pleasure of being creative, of challenging and improving the system.

To find an undeveloped situation, to see the possibilities, to identify yourself with something worth doing, to put yourself into it and stand up for it--that is a satisfaction in comparison with which superficial pleasures are trivial. But to accomplish this you must fight apathy in yourself as well as in others, and apathy is the largest single stumbling block to efficient Government.

Throughout history it has been the inaction of those who were in the position to act, the indifference of those who should have known better, the silence of the voice of justice when it mattered most, that has made it possible for evil to triumph. Some in positions of authority are overly obsessed with the contemporary weakness for trying to see the other side's point of view, relying extensively on the debate technique that it is right to take both sides of any issue, without having convictions of their own based on facts, experience, and judgment. They also possess the romantic ability to hold fast to beliefs and policies that run directly contrary to the evidence before them. By means of these beliefs they are able to find intellectual escape from the inevitability of struggle and absolve themselves from the painful experience before them.

Every individual must have a purpose outside his own interests if he is to play a useful part in his society and if he is to survive. But it is obvious that many individuals have become lost in their life and have forgotten the purpose for which they were created and for which they are being paid.

If we do not work to serve our society, what other purpose do we then have? It lies with each of us to determine whether, when he becomes old, he will have to regret his wasted years. I often remember Carlyle's simple bookplate. I saw it when I was young, and it left a deep impression on me. It shows a lighted candle beneath which stands the words:

"I burn that I may be of use."

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A HUMANISTIC TECHNOLOGY

by

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at the
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of the
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Change is now part of life in all industrially advanced countries—continuous, rapid, all-pervading change. The ultimate cause of this unsettling situation is the explosion of science: factual knowledge doubles every decade or so. Its direct cause is the technological revolution: new knowledge is put to practical use about as rapidly as knowledge itself expands.

The impact of technology on individuals and on society at large is profoundly affected by the attitude of the public and of its leaders toward technology; that is, by prevailing concepts of what technology is and what purpose it should serve.

When technology is believed to be a force with a momentum of its own that puts it beyond human direction or restraint, it may become a Frankenstein monster destroying its creator. But when it is viewed humanistically, in other words, as a means to human ends, it can be made to produce

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maximum benefit and do minimum harm to human beings, and to the values that make for civilized living. It may even enable man to become more truly human than it has ever been possible for him to be. Of technology it can be truly said that it is not "either good or bad, but thinking makes it so."

I propose to show there is a tendency in contemporary thinking to regard technology as an irresistible force rather than a tool. The tendency is more pronounced in some countries than in others but is observable wherever there is rapid technological progress. Since it encourages the use of technology in ways that on balance are harmful, this viewpoint should be replaced by a humanistic attitude—an attitude that looks upon technology as an instrument created for no other purpose than to serve man.

There is no need to belabor the point that technology, properly used, can be of great benefit. But there is need to bring out the potential harm which technology, improperly used, may cause. My concern is with attitudes, for I believe it is attitudes that determine what we do with technology.

The part played in the formation of popular attitudes by all media of communication—books, newspapers, journals, radio, television—is too obvious to need comment. Apart from formal education, which for most people ends at the threshold of maturity, these media bear the responsibility of supplying the factual information men must have if they are to arrive at rational judgments on issues that interest them as individuals, or concern them as citizens of a democratically organized society. Many of these issues contain technological elements. In presenting them to the public, it is important to assign these technological elements their appropriate place. Therefore, those involved with communications—using the term in its broadest connotation—must themselves have a clear conception of the nature of technology and of its proper role.

Technology has been defined as "covering the field of how things are commonly done or made," and, somewhat more broadly, as "what things are done or made." It is a modern term but we are in the habit of using it retroactively. We apply it to the techniques of a preindustrial metal worker, no less than to those of a modern metallurgist. Yet modern technology differs significantly from that of the past in being largely science-based, that is, founded on accurate knowledge of the workings of nature. Earlier techniques, arts, skills were almost entirely empirical. Because of his knowledge of nature, man, through technology, is now able to alter his material environment, the material conditions of life. If these changes are to be beneficial, not harmful, technology must be managed as a humanistic enterprise.

By boring into the secrets of nature, scientists discover keys that can be used to unlock powerful forces. Technology is concerned with putting these forces to practical use. The apparatus set up for this purpose is huge and complex, difficult for laymen to understand. Yet the basic nature and purpose of technology are not beyond the comprehension of ordinary citizens.

Technology is tools, techniques, procedures, things; the artifacts fashioned by modern industrial man to increase his powers of mind and body. Marvelous they are, but let us not be overawed by these artifacts. Certainly they, themselves, do not dictate how we should use them nor, by their mere existence, do they authorize actions that were not anteriorly lawful. We alone bear responsibility for our technology. In this, as in all our actions, we are bound by the principles governing human behavior in our society. Ethics, I hardly need say, are not only personal but social as well.

This surely must be obvious to any reasonable man. Yet it cannot be overemphasized, for a considerable body of opinion propagates what comes close to being the opposite view. The notion is widespread that, having wrought vast changes in the material conditions of life, technology perforce renders obsolete traditional concepts of ethics and morals, as well as accustomed ways of arranging political and social relationships. Earnest debates are currently taking place as to whether it is possible to act morally in the new technological society, and proposals have been made—quite seriously—that science must now replace traditional ethics! We have here a confusion of means with ends that should be cleared up.

The laws disclosed by science must, of course, be heeded by those who wish to exploit scientific discoveries; in his technological activities man is bound by the laws of science. But it does not follow that he is bound by the laws of science in his purely human relations as well.

"Science," wrote Vannevar Bush, "has come a long way, in delineating the probable nature of the universe that surrounds us, of the physical world in which we live, of our own structure, our physical and chemical nature. It even enters into the mechanism by which the brain itself operates. Then it comes to the question of consciousness and free will—and there it stops. No longer can science prove, or even bear evidence. Those who base their personal philosophies or their religion upon science are left, beyond that point, without support."

Through technology man has been relieved of much brutal, exhausting, physical labor as well as boring routine work; he has been provided with numerous mechanical slaves who do certain kinds of work faster, cheaper and more efficiently than people. Why should the ease and affluence made possible by technology affect precepts that have guided Western man for centuries? This may brand me as old-fashioned but I have not yet found occasion to discard a single principle that was accepted in the America of my youth. Why should anyone feel in need of a new ethical code because he is healthier or has more possessions or more leisure? Does it make sense to abandon rules one has lived by because he has acquired better tools for doing his work?

Tools are for utilizing the external resources at our disposal; principles are for marshaling our inner, our human resources. With tools we alter our physical environment; principles serve to order our personal life and our relations with others. The two have nothing to do with each other.

It disturbs me to be told that technology "demands" an action the speaker favors, that "you can't stop progress." It troubles me that we are so easily pressured by purveyors of technology into permitting so-called "progress" to alter our lives, without attempting to control it—as if technology were an irrepressible force of nature to which we must meekly submit. If we reflected, we might discover that not everything hailed as progress contributes to happiness; that the new is not always better nor the old always outdated.

Perhaps we are receptive to these arguments because we tend to confuse technology with science. Not only in popular thinking but even among the well-informed the two are not always clearly distinguished. In consequence, characteristics pertaining to science are attributed to technology. The etymology of the word may contribute to this confusion. Its suffix lends to technology a false aura—as if it signified a body of accumulated, systematized knowledge, when in fact the term refers to the apparatus through which knowledge is put in practical use. The difference is important.

Science has to do with discovering the true facts and relationships of observable phenomena in nature, and with establishing theories that serve to organize masses of verified data concerning these facts and relationships. Because of the care scientists take to verify the facts supporting their theories, and their readiness to alter theories when new facts prove an established theory to be imperfect, science has great authority. What the scientific community accepts as proven is not questioned by the public. No one disputes that the earth attracts the moon, or that atomic fission produces energy.

But technology cannot claim the authority of science. It is properly a subject of debate, not alone by experts but by the public as well. It has proved anything but infallibly beneficial. Much harm has been done to man and nature because technologies have been used with no thought for the possible consequences of their interaction with nature. A certain ruthlessness has been encouraged by the mistaken belief that to disregard human considerations is as necessary in technology as it is in science. The analogy is false.

The methods of science require rigorous exclusion of the human factor. They were developed to serve the needs of scientists, whose sole interest is to comprehend the universe; to know the truth; to know it accurately and with certainty. The searcher for truth cannot pay attention to his own or other people's likes and dislikes, or to popular ideas of the fitness of things. This is why science is the antithesis of "humanism," despite the fact that historically modern science developed out of and parallel to the humanism of the Renaissance.

What scientists discover may shock or anger people—as did Darwin's theory of evolution. But even an unpleasant truth is worth having; besides one can choose not to believe it! It is otherwise with technology. Science, being pure thought, harms no one; therefore it need not be humanistic.

But technology is action, and often potentially dangerous. Unless it is made to adapt itself to human interests, needs, values, and principles, more harm will be done than good. Never before, in all his long life on earth, has man possessed such enormous power to injure his human fellows and his society as has been put into his hands by modern technology.

This is why it is important to maintain a humanistic attitude toward technology; to recognize clearly that, since it is a product of human effort, technology can have no legitimate purpose but to serve man—man in general, not merely some men; future generations, not merely those who currently wish to gain advantage for themselves; man in the totality of his humanity, encompassing all his manifold interests and needs, not merely some one particular concern of his. Humanistically viewed, technology is not an end in itself but a means to an end, the end being determined by man himself in accordance with the laws prevailing in his society.

A word may be in order concerning the disparate meaning of the word law, depending on whether it is used in the ordinary sense—which is also the original sense of the word—or by scientists. Law, as commonly understood, refers to those rules of human conduct prescribed and enforced by society. The scientists have appropriated the term. They use it to describe regularities exhibited by physical phenomena—the rules by which the cosmos governs itself. In the transition, the word has taken on a new meaning.

Law that governs human society is not the result of scientific method, but of wisdom and experience, of consensus as to what is just and fair. In autocracies, law is what the ruler wishes it to be and what he is able to enforce by naked power. The purpose of human law is to resolve conflicts by the application of definitive rules. These rules are always debatable and can be changed when there is public demand for a change or when the rule maker desires them to be changed.

From the layman's point of view, what the scientist calls law is fact, rather than law—immutable fact. Or, if you prefer, it is law operating in a sphere where man exercises no influence. He cannot alter the laws of the cosmos; he can only discover them. It would be pointless for him to debate these laws; he must accept them. A law of science expresses mechanical regularity where no choice of action, no free will comes into play; it deals with constancy of behavior in nature; it has relevance for man only because it makes the universe more comprehensible to him and, by disclosing how nature works, allows him to utilize the forces of nature for his own purposes.

When we make use of these forces, we must, of course, heed the laws of science which describe their behavior; they are laws we cannot bend to our will. But we must likewise heed the man-made laws of our society, for technology is action which affects fellow human beings. Technology straddles, as it were, the law of the cosmos and the law of man; it is subject to both. Much confusion in popular thinking arises from this fact.

The two laws are confounded. Or, to put it differently, they are thought to be part of a single system of law so that one or the other must perforce take precedence.

Ever since science discovered that the earth is not the center of the cosmos, as had been maintained by the highest human authorities, we have been learning painfully that the laws of science cannot be overturned by human fiat. Today, acceptance of duly authenticated scientific theories or laws is common practice in enlightened countries. Occasionally, an attempt is made to muzzle scientists whose findings contravene accepted dogma—as when Russia forced geneticists to conform to the party line, or when some community forbids teaching evolution because this conflicts with the community's religious dogma. But these are rare cases and no reasonable person condones them.

It has taken a long time to attain this rational attitude toward science, and we are conscious of the consequences of intolerance in the past. Perhaps this is why we have been excessively tolerant toward those who claim the right to use technology as they see fit, and who are wont to treat every attempt by society to regulate such use in the public interest as if it were a modern repetition of the persecution of Galileo!

Assuredly, we have the right to use the instrumentality of law and of government to protect ourselves against technological injury. Yet this simple truth is obscured by the effective way in which opponents of protective measures play upon the layman's respect for science—in a conscious or unconscious attempt to brainwash the public so it will accept their argument without debate. When attacking legislation that would restrain the user of technology, it is common practice to argue as if at issue were acceptance of a law of science. Yet what is being discussed is not science but the advisability or legality of the technological exploitation of science. The public would not be deceived by such arguments if it clearly understood the fundamental difference between science—which is pure knowledge—and technology—which is action based on knowledge.

To guard against being misled, one should cultivate an attitude of skepticism whenever the word science is used. Is it science that is being discussed or is it technology? If technology, the question at once arises whether the proposed action is legally permissible and socially desirable. These are matters that lie outside science. Just as the law of the cosmos cannot be overturned by human fiat, so is human law supreme within its own proper sphere of operation. Technology must therefore conform to that most basic of all legal maxims, the "mutuality of liberty"; the principle that one man's liberty of action ends where it would injure another. Without this maxim, freedom would be a barren privilege.

Humanistically viewed, technology can have no legitimacy unless it inflicts no harm. Granted this premise, the prerequisite for users of technology is—or ought to be—that they comprehend and respect the laws of science applicable to their particular technology; that they exercise a prudent man's care in assessing the probable consequences of this technology; and, should it be potentially harmful, that they abstain from using the technology until they have found ways to render it harmless.

Whether or not a particular technology has harmful potentialities ought not to be decided unilaterally by those who wish to use it. Destructive technologies are often highly profitable for those promoting them. They have a vested interest in the technology; it may give them money, reputation, power. They are an interested party to the conflict between private and public interest that every potentially harmful technology poses. Moreover, they are nearly always practical men more knowledgeable about efficiency in using a technology than about the legal and scientific implications of such use.

A broader range of intellectual power should be brought to bear on the whole question of technological exploitation of scientific knowledge. Purely practical considerations should be supplemented with scholarly knowledge of long-range consequences; private interest in efficiency with public interest in safety. The automatic discipline of a free market—where it still exists—does not include side effects and long-range consequences; it merely reflects consumer preference for a product that appears useful and is reasonably priced. The consumer is too ill-informed about safety to make his opinion felt.

I think one can fairly say that the *practical* approach to a new scientific discovery and its utilization through technology is usually *short-range* and *private*, concerned only with ways to put the discovery to use in the most economical and efficient manner, little thought being given to its ultimate consequences. The *scholarly* approach—if I may use this term—is *long-range* and *public*; it looks to the effects which a new technology may have on people in general, on the nation, on the world; on present and future generations. Of course there are men who combine the two approaches and you find them among people whose primary interest is practical, no less than among those whose primary interest is scholarly. Both approaches are necessary to illuminate the problem and help solve it. To exclude the one or the other prevents finding the way to a humanistic technology.

I can best illustrate what I want to bring out by a simple example. Commercial deep-sea fishing can be done so efficiently with modern techniques that a few enterprises could rapidly sweep the oceans free of commercial fish. And this is what the fishermen of all nationalities wish to do. As practical men they are interested only in using technology to increase their catch, preserve it and get it to market as speedily as possible. In pursuing this short-range private objective, they have been quite ingenious. Figuratively speaking, the world's marine scholars have stood by wringing their hands at the fishermen's "practical" folly. To the scholars it has been incomprehensible that rational human beings should fail to see that in the end more can be taken from the sea if fishing conforms to sensible conservation measures which permit the species to reproduce itself.

We witness at the moment the end of one of the saddest cases of misuse of technology by greedy fishing interests. Unless these interests are curbed by truly effective international action, the great whales—the blue, the finback, the sperm—will soon disappear, victims of man's "practical" folly.

These and other whales once populated the high seas in immense numbers. For hundreds of years whaling remained a reasonably fair contest between man and the intelligent, swift-moving mammals he hunted. Modern technology has turned it into brutal genocide. Blindly pursuing what they doubtless consider an eminently practical objective—maximum profit today—the whalers are wiping out the very resources that could insure them a profit tomorrow.

Hunting of the blue whale has now been prohibited, but not so for the finback whale. Ten of the whaling nations are now willing to ban the catching and killing of all whales—Japan and Russia will not agree. Thus, despite long efforts to regulate whaling, the problem still exists.

Practical considerations aside, is anyone justified in using technology to exterminate a species that has existed on this earth for eons—the largest animal the world has ever seen? Are we certain our descendants may not at some future time have need of these mammals? R. A. Piddlington, in his book The Limits of Mankind, remarks that nobody knows what the biological consequences are likely to be of the whales' extermination. "But," he says, "if nearly a million of these huge animals, with their enormous appetites, can be removed in a single generation from the balance of marine life without causing violent repercussions, all our previous experience of this subject has given us the wrong answers." He notes that the sperm whale is the only creature eating "that nightmarish monster the giant squid," and suggests that one consequence of exterminating this huge whale may be a tremendous increase in the population of giant squid and their penetration close to our shores—not a pleasant prospect.

Technological damage to deep-sea fisheries happens to be an international problem, therefore particularly difficult to solve. But quite as disastrous in its ultimate consequences is the discharge of poisonous waste products by industrial plants using rivers and lakes as their private sewers. Valuable national fisheries have been ruined, not to speak of harm done to those who may eat fish poisoned by the waste products of new technologies. Detergents pose a similar problem. They are cheaper to manufacture than soap, hence more profitable to the producer, and they are preferred by consumers for their superior cleansing capacity. But discharged into waterways their organically undissolvable chemicals have proved particularly intractable pollutants.

As with technological damage to deep-sea fisheries worldwide, pollution is an international problem. Unfortunately, the world is still far from being prepared to accept international controls on pollution. Among the obstacles to global controls is the fear by many industries and governments alike that controls will impose upon them excessive economic costs and thus put them at a competitive disadvantage in world markets. Even stronger resistance to environmental controls comes from underdeveloped countries whose food supplies are dependent, or soon may be dependent, on heavy use of fertilizers, pesticides, and herbicides. These countries see pollution as a lesser evil than hunger and the uncontrollable spread of diseases.

Irretrievable damage has been done by those who use technology without giving thought to its effect on our environment. Waste products, carelessly emitted, create a massive problem of soil, water and air pollution—we may be damaging the atmosphere permanently by changing its chemical composition. Wholesale slaughter of wild animals upsets the ecology with consequences we cannot even fathom as yet.

Insofar as damage is still remediable—and much of it can never be undone—it must be remedied by public action, at taxpayer's expense. The total cost to the public of private carelessness and willfulness in the use of technology will be enormous.

Experience shows that by itself, the legal maxim of "the mutuality of liberty" will not prevent premature commitment to technologies that may later prove harmful. The maxim must be implemented by preventive public action—action of the kind that has long been operative in the field of public health. There is need for laws requiring that before a particular technology may be used, reliable tests must have been made to prove it will be useful and safe. A few such laws are already on the statute books; more are needed. But we rarely get positive action until a human tragedy dramatizes the need for protection. So was it once, too, with preventive public health measures.

You will remember that they received their major impetus from the great cholera invasions of the last century. These were themselves a result of new technologies in transportation which enormously speeded the movement of persons and goods. The time interval for travel from the area of endemic cholera in the Far East to Europe and America was reduced below the incubation period of the disease. Without strong measures, the West could not protect itself against disease carriers coming from the East. These measures were bitterly fought because they impeded the movements of people and merchandise. It took repeated major epidemics to compel action.

In the United States we now have preventive laws protecting the public against dangerous drugs. The first law, strongly opposed by the pharmaceutical interests, did not pass until a major tragedy had occurred—the death of a considerable number of patients who had taken a drug which was effective in the treatment of their particular disease, but had unforeseen side effects proving fatal to some. After much procrastination, a second, more stringent law was passed, but not until the uproar over the thalidomide babies caused the legislators to respond with alacrity.

Though a technology may clearly harm paramount human values, restraining laws are generally not enacted unless public demand is sufficiently vocal and persistent to wear down the opposition of those with a vested interest in the harmful technology. Opposition tactics follow a pattern that is monotonously repeated whenever the attempt is made to regulate a technology in the public interest. It is well to familiarize oneself with the pattern.

I have mentioned efforts to confuse the issue by arguing as if a law of science were at issue when in fact the proposed legislation deals with technology, not science. If this argument fails, the need for the proposed law is then categorically denied. Warnings of scientists are rejected as "unproven" and "exaggerated." Later, when these prove to have been entirely correct, the argument shifts from the substantive question of whether a technology is harmful to an attack on the legitimacy of any kind of protective legislation. Such legislation would violate basic liberties, it is claimed; it would establish government tyranny and subvert free democratic institutions. If all this proves futile and legislation is imminent, there will be urgent demands it be postponed until "more research" can be undertaken to establish the appositeness of the proposed law.

These delaying tactics are highly effective. It takes firm commitment to a humanistic technology to push through needed legislation as well as thorough understanding of the filibustering tactics of opponents, and great skill in combating these tactics. No wonder public opinion and the law have nowhere fully caught up with those who misuse technology. Often as not they escape with impunity, no matter how gravely they injure man or society.

I suggest that, as a special public service, those trained in the law take on the task of working for better protection against technological injury. This is a new and fruitful area in which lawyers could make important contributions to human welfare—an area which requires no revolutionary change in the political or economic structure of society, merely greater precision and fuller implementation of the traditional principle that injuring the health or causing the death of human beings is unlawful. The term health should not be limited to physical health but should include psychic health and protection of the human personality as well. New technologies based on the uncertain "science" of the social sciences involve snooping into the inner recesses of the human mind, personality testing and pseudo-scientific manipulation of human beings.

When they are imposed as conditions of employment, such as the lie-detector tests often used today, or otherwise partake of an element of compulsion, these technologies should be regulated or outlawed entirely.

Much more thought should be given to technological interference with the balance of nature and its consequences for man, present and future. Let me give you one more example of the harm such interference may cause.

Today we have new technologies for the destruction of insect pests and weeds. Their use is profitable for the manufacturers of pesticides and weed killers; it is helpful to farmers who are able to get better crops, reduce human labor, and produce at greater profit; it benefits consumers who are offered a wider variety of food at less cost. Here is a classic case of what technology can do for us. Unfortunately, we have left out of consideration the balance of nature. If used improperly, these pesticides and weed killers poison soil, crops, birds, animals, fish and eventually man. In her book Silent Spring, Rachel Carson spoke out eloquently against committing this ecological sin.

Ecologists constantly warn us that when the balance of nature is upset, everything in nature is threatened, including man himself. It seems certain that, unless he sets limits to his destructive instinct, man will ultimately exterminate all wild life. He will then be left alone on earth with his domesticated animals and with swarms of insects and germs; alone in a world he has fashioned in the image of his technology.

Insects have flourished on this earth for 350 million years or more and outnumber man by a factor of hundreds of thousands. They are better adapted to survive new technologies than larger animals. A few specimens always survive whatever poison may be administered to them. Multiplying with fantastic rapidity, they then present man with a hardier strain which he must attack with still more poisonous pesticides. The true victims of this endless battle are not the insects but other living creatures, our natural allies in the war against insects. Piddlington closes his chapter on the balance of nature with a synthetic proverb which doubtless makes no sense to practical men but will be readily understood by those who comprehend the ABC's of ecology: "Whoever destroys an elephant creates a thousand rats, or a million flies."

The examples I have given show that to make technology safe, we must have protective laws; that enactment of such laws depends upon a humanistic attitude toward technology on the part of significant segments of the public and its leaders. But more is needed. Law and public opinion nearly always lag behind the swift development of new technologies. Therefore what is additionally needed is more informed and responsible thinking among those who manage technologies. This can best be brought about by professionalizing the decision-making process in technology.

Experience has shown that, in the hands of professional persons, technology is managed with greater concern for human welfare than when it is controlled, as at present, by nonprofessionals. The classic example is medicine.

Of all technologies, that of the physician has benefited man most and harmed him least. The stringent standards set by the profession and by society for the education and professional conduct of physicians accounts for this happy circumstance. Not only is no one permitted to practice who has not given proof of his competence, but physicians must also be broadly, liberally, humanistically educated men and women. This gives them perspective in evaluating their professional actions, an ability to see these actions against a humanistic background. Moreover, they operate under a code of ethics which requires them to place the needs of patients above all other considerations.

We owe to Greece the noble idea that special knowledge and skill ought to be used humanistically, instead of merely for personal aggrandizement or power, or as a means of extracting maximum gain from those in need of the services of men possessing special expertise. It was a novel idea at the time, and remains unknown to this day in many regions of the world. Even among the people of Western civilization, the precept is rarely followed outside medicine and a few other "learned" or liberal professions. Most human affairs are conducted on the old Roman maxim of caveat emptor.

I have long believed that we should come appreciably closer to a humanistic technology if engineering were practiced as a humanistic profession and if, in consequence, engineers were accorded the professional independence granted members of liberal professions. I feel certain engineers would then find it possible to act with the same sense of professional responsibility and service to humanity that is characteristic of good physicians. It may be that in some countries engineering has already attained the status of a truly liberal or humanistic profession. But I doubt this is the case in the United States.

Engineering now stands at the threshold; there is no reason why it should not enter the liberal professions. It has as its theoretical foundation a body of systematic knowledge, an academic discipline as rigorous and extensive as that of other learned professions. It has a highly developed technique for applying this specialized knowledge to practical problems. But today there is no absolute requirement that an engineer must be a liberally educated man, nor has engineering adopted the kind of ethical code that governs the older professions of medicine and law.

It is because of the "professional" characteristics I have here stated that members of the "learned" professions demand and are accorded professional independence. "The essence of professions," wrote Abraham Flexner, an expert in this field, "resides in the application of free, resourceful, unhampered intelligence to the comprehension of problems." Service ceases to be professional if it has in any way been dictated by the client or employer.

The role of the professional man is to lend his special knowledge, his well-trained intellect, his dispassionate habit of visualizing problems in terms of fundamental principles to whatever specific task is entrusted to him. Professional independence is not a special privilege but rather an inner necessity for the true professional man; it is a safeguard for his employer and for the public as well. It is what chiefly sets him apart from the skilled technician.

This independence of professional judgment has not yet been accorded the engineer. He still has to win it for himself. Engineers are nearly always salaried employees rather than self-employed, which makes it all the more essential that they gain professional status. Where engineers and physicians work in the same organization, it happens not infrequently that the most experienced engineer's professional judgment will be overruled by a lay superior, while no one would think of dictating to a physician, no matter how young and inexperienced he might be. Yet the university-trained engineer is as competent a professional in his field as is the physician. The difference lies in the determination of the medical profession to resist lay interference and its success in winning this point, while the engineering profession has shown little determination and therefore has had little success.

I speak of this with feeling. As you know, my work is in one of the new technologies; one that is dangerous unless properly handled. I am frequently faced with the difficulty of convincing administrative superiors that it is not safe for them to overrule their technical experts. Here is a case in point:

A superior once asked me to reduce radiation shielding in our nuclear submarines. He said the advantage of getting a lighter-weight reactor plant was worth risking the health of personnel. It was not possible to make him see that such a concept could not be accepted; that, moreover, where radiation is involved, we are dealing not just with the lives of present day individuals but with the genetic future of all mankind. His attitude was that we did not know much about evolution and if we raised radiation exposures we might find the resulting mutations to be beneficial—that mankind might "learn to live with radiation." As you may surmise, I did not reduce the thickness of the shielding.

We are fortunate to live in a country so organized politically that individuals enjoy the greatest possible freedom consistent with their obligations as members of a civilized society. But freedom always comes at a cost. As citizens of a free, self-governing society, we are individually and severally responsible for the quality of our society. The values making for civilized life are neither created nor preserved without continuous effort. In a democracy it is the people themselves who must make this effort.

A final word needs to be said concerning the impact of technology on the political institutions of a free society.

By making it possible for affluence and leisure to be spread over large segments of the population—theoretically over all the people—technology gives support to democratic institutions. We are approaching a situation comparable to that of Athens, Greece, 2500 years ago where every citizen was an active participant in the governance of his city state. He would not have had the leisure to do this, had there not been slavery. Today each of us has many more mechanical slaves than the Athenian had live ones. We have at least as much leisure as he had to devote to public affairs.

The Athenian, however, dealt with public issues that were not beyond the comprehension of ordinary citizens. Modern democratic citizens, on the other hand, are faced with issues that are extremely difficult for laymen to understand. They must depend, to an extraordinary degree, on the advice of experts. Whether such advice is competent, as well as impartial, is often hard to judge. Much of the difficulty arises from the complexities technology introduces into modern life. To the extent that it renders public issues incomprehensible to ordinary citizens, technology undermines democratic institutions.

Technology-created affluence and leisure make it possible for all advanced industrial countries to socialize the cost of education, thus giving every citizen a chance to become as educated as his God-given talents and his determination allow him to be. The opportunity is there, but will it be seized?

We do not yet know whether people may not prefer to live the life of the idle rich—as they imagine it to be—pursuing fun and games, not bothering about becoming educated or meeting their public responsibility. Or whether they will decide to emulate those—and there were many in all ages—who considered material comfort and leisure a trust, to be used for improvement of self and society. We have a choice, but unless democratic electorates raise their competencies to a higher plateau, they will discover that they cannot effectively control either their government or their technology.

It is obvious that a society's technological level determines the range of occupational skills for which there is effective demand. The higher the level, the smaller the demand for unskilled laborers, the greater for intelligent, well-educated professional persons, semiprofessionals, skilled technicians. Less obvious is the fact that technology also sets a lower limit to the educated intelligence citizens must have if they are to meet their public responsibilities—a sort of Plimsoll mark. Those who fall below this mark are precluded from participating in the public dialogue through which consensus is formed in free societies; they are precluded simply because they do not understand public issues involving technology. Democracy is not viable if too many fall below this mark.

In an oversimplified way, one might say that in a free society citizens have private liberties and public responsibilities; they safeguard their private liberties by faithfully discharging their public duties. Any diminution, whatever its cause, of the individual citizen's ability to think independently about matters that determine the shape of his society, any lessening of his participation in its governance, makes society less free, democracy less viable.

How we use technology affects profoundly the shape of our society. In the brief span of time—a century or so—that we have had a science-based technology, what use have we made of it? We have multiplied inordinately, wasted irreplaceable fuels and minerals and perpetrated incalculable and irreversible ecological harm. I have thought much about this, and I can find no evidence that man contributes anything to the balance of nature—anything at all. On the strength of his knowledge of nature, he sets himself above nature; he presumes to change the natural environment for all the living creatures on this earth. Do we, who are transients and not overly wise, really believe we have the right to upset the order of nature, an order established by a power higher than man?

These are complicated matters for ordinary citizens to evaluate and decide. How, in future, to make wiser use of technology is perhaps the paramount public issue facing electorates in all industrial democracies; a problem difficult enough in itself but rendered still more so by the strategies of those who wish to continue using harmful technologies.

As I said at the beginning of my address, the communications media could render great service by providing the public with a balanced view of the issue. Reportage which consistently takes a humanistic attitude toward technology would be of immense help. So would consistent stress on the propriety of laws to prevent technological damage. It cannot be said too often that government has as much a duty to protect the land, the air, the water, the natural environment of man against such damage, as it has to protect the country against foreign enemies and the individual against criminals; conversely, that every citizen is duty bound to make an effort to understand how technology operates and what are its possibilities and limitations. All this is necessary if technology is to be assigned its proper place in human affairs, if it is to be made humanistic.

A free society centers on man. It gives paramount consideration to human rights, interests and needs. But once ordinary citizens come to feel that public issues are beyond their comprehension, a pattern of life may develop where technology, not man, would become central to the purpose of society. If we permit this to happen, the human liberties for which mankind has fought, at so great a cost of effort and sacrifice, will be extinguished.

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THE ROLE OF ENGINEERING IN THE NAVY

by
Admiral H. G. Rickover, USN
before the
National Society of Former Special Agents
of the Federal Bureau of Investigation
Seattle, Washington
August 30, 1974

In ancient times a philosopher came to a city. He was determined to save its inhabitants from sin and wickedness. Night and day he walked the streets and haunted the marketplaces. He preached against greed and envy, against falsehood and indifference. At first the people listened and smiled. Later they turned away; he no longer amused them. Finally, a child moved by compassion asked: "Why do you go on? Do you not see it is hopeless?" The man answered: "In the beginning, I thought I could change men. If I still shout, it is to prevent men from changing me."

I feel like that man as I talk to you today. I have fought for reform in the Navy for years. If I still shout, it is because I am afraid the Navy will not be able to meet the demands which will be placed upon it in the future. There are two broad reasons for this condition. First, we misread history. Second, we do not ask the root question—What is the Navy's purpose?

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The Navy exists to defend our Nation—it has no other purpose. It serves as a shield in peace as well as in war; for, in final analysis, diplomacy rests upon the deployment and use of military force. We all recognize this truism. What is wrong is that the Navy misreads the lessons of its past wars. It congratulates itself upon the victories and believes that, by merely tampering with its organization, it can meet the needs of today. It does not ask the question: How well did we do compared to how well we should have done?

This question demands a fresh look at our naval past. Instead of basking in past glories, we should ask: How well were the ships designed and built; how well were they used in battle? These are matters of engineering. In discussing engineering in the Navy, I am not going to consider the present state of ordnance in the Navy. That area has been run by line officers throughout this century and its failures are well-known. I will leave that subject to another critic who has the time and experience to describe it. Nor will I address aeronautical engineering, which is a field unto itself administered within the naval aviation command.

What I will talk about today is engineering as it deals with warship design, construction, and operation. How did this type of engineering evolve? How did we get to the fix we are in now, where the Navy is dangerously weak in these technical areas? What must we do to get on the road to recovery?

Throughout naval history there have been two important groups of men: the ones who fought the ships, and the ones who designed and constructed them. The ones who issued orders in the face of the enemy were the officers of the line of battle—the line officers. Designers and constructors were considered by line officers to be inferior. Yet success on the day of battle depended upon the skill of all.

The Navy of today is far more complex than it has ever been, but the fundamental distinction still exists between the role of the line officer and that of the officer whose specialty is ship design and construction—the naval engineer. The matter is complicated because there are two types of engineers: those at sea operating the machinery and those ashore who are charged with the responsibility for design and development of new ships and their equipment.

Origins of modern engineering in the Navy go back to 1814 with the first steam-driven warship, the Demologos, designed and built by Robert Fulton. In the following decades, the Navy built few ships with steam engines. The early engines were low-powered, unreliable, inefficient, and were used chiefly as an auxiliary to sail. The Navy could easily recruit engineers from civilian life to operate these engines. Engineers were given no military duties as these were the preserve of the line officer, the aristocrat of the Navy. Therefore, from the beginning there was a gulf between the line officer and the engineer who operated the engines.

The line officer detested the greasy engineer and his smoking boilers that blackened the sails. Not until 1842 did Congress authorize an engineer corps for the Navy. The selection of the first engineer-in-chief was evidence of the low prestige of naval engineering. Gilbert L. Thompson combined the talents of law, scholarship, and diplomacy, but he knew no engineering. He could not speak for the engineers in the Navy, nor could he judge engineering problems.

Engineering, both in operating the shipboard machinery and in the design and construction of ships, became critically important with the outbreak of the Civil War. The Navy had to blockade a coastline stretching over 3,000 miles from the Potomac to the Mexican border. It had to support the Army on the rivers; it had to search out and destroy Confederate raiders. For all these purposes, the steam engine and the engineer were indispensable. On the day of battle, steam engines drove the Monitor and the Merrimack, the Kearsarge and the Alabama, as well as the gunboats which supported Grant before Fort Donelson and Vicksburg. In 1862, Congress recognized the importance of engineering by creating the Bureau of Steam Engineering.

When Lee surrendered, the United States Navy was the most effective sea power in the world. That position depended upon engineering which, in turn, was based on the skill of Benjamin F. Isherwood, first Chief of the Bureau of Steam Engineering. He designed and built engines rugged enough to withstand the shock of combat, as well as ill-treatment by poorly-trained operating engineers. He also designed and constructed a well-armed cruiser which was faster than any abroad. In addition, American naval leadership rested upon ingenious civilian engineers and inventors such as John Ericsson, who designed and built the Monitor.

From this pinnacle of leadership the Navy fell swiftly. We had not learned the lesson of the need for good engineering and competent engineers. As a nation, we became complacent. We believed the Monitor was the embodiment of sea power, yet the turret and armored hulls had already been developed in Europe. Wrapped in the security of ignorance, we became slave to the Monitor-type. We had faith in them as major combatant ships long after other nations had recognized that they were only a brilliant improvisation to a specific problem. The main line of naval progress remained in Europe. We had misread the naval results of the Civil War.

The Navy forgot the hard-earned lessons and attempted to return to the days of sail. Aboard ship, the position of the engineer deteriorated. The chief engineer and his men were at the beck and call of the line officer. He was denied the living quarters to which he was entitled. He was forced to give way to the most junior line officer. He was not even allowed to eat in the same mess with the line officers. He found his firemen taken from his control and set to work shifting sails. One chief engineer complained that he could not overhaul and repair the machinery because he did not have use of his men. The captain replied that he needed the engineering force for deck drills; if repairs to the engines were necessary, they could be made at night. Under these conditions the Navy had trouble recruiting and holding engineers, and ships failed to meet their commitments. The Acting Chief of the Bureau of Steam Engineering, William H. H. Smith, officially warned in 1883 that the Navy's standards had dropped below those for merchant ships. If a private shipowner operated with as few engineers, he could not insure his ship, and would be liable to criminal prosecution.

When the United States began to rebuild its Navy in the 1880's, it faced serious difficulties. The Nation had fallen behind in marine engineering, in naval architecture, and in ordnance. Because the Navy had built few ships in the previous decades, there had been no need for men skilled in naval design and construction. The United States did not have the facilities to build modern armored vessels, nor did the Navy or industry have the ability to design them. We had to import the technical knowledge, chiefly from England. In addition, the line officers had lost their professional competence because our naval ships had become obsolete. Therefore, the engineers and the line officers who were engaged in the design of new ships lacked experience.

To coordinate ship design and construction, Secretary of the Navy Benjamin F. Tracy, in 1889, set up the Board on Construction. Its membership varied, but always included the Chief of the Bureaus of Construction and Repair, Steam Engineering, Equipment, and Ordnance. The Engineer-in-Chief of the Navy headed the Bureau of Steam Engineering, while the Chief Constructor headed Construction and Repair. They were professional engineers and naval architects. Line officers usually were Chiefs of the Bureau of Equipment and the Bureau of Ordnance.

Under these conditions, mistakes were inevitable. But, by and large, the worst errors were caused by the imposition of the opinions of line officers on technical matters. The result can be seen in the Navy's first three battleships, one of which was the famous Oregon. The Bureau of Ordnance, headed by a line officer, proposed a turret and gun arrangement based on the hoped-for success of technical developments. When these did not materialize, the turrets had to be redesigned. As a result, when any of these ships swung its guns to deliver a broadside, it heeled over to such an extent that the armor belt on the side toward the enemy dipped below the waterline, giving no protection to the ship.

Another example of poor design occurred during the planning of the Kentucky-class battleships, laid down in 1896. The main battery was to be two turrets with a pair of 13-inch guns, and two turrets with a pair of 8-inch guns. The Chief of the Bureau of Ordnance proposed that the

8-inch turrets be placed on top of and integral with the 13-inch turrets. The 8-inch turrets could, therefore, not rotate independently. Whatever the 13-inch guns aimed at, so did the 8-inch guns on the turret above. The Chief of the Bureau of Ordnance—a line officer—got his plan accepted over the strenuous objections of the Chief Constructor. Theodore Roosevelt, as Assistant Secretary of the Navy, was aware of the serious criticism of this design. Yet he also knew that the Chief of the Bureau of Ordnance was a line officer of great prestige among his brother officers. This episode was an instance—not uncommon in the Navy—where officers with a reputation in one field are assumed to be expert in another.

The Battle of Santiago, during the Spanish-American War, revealed that line officers did not know how to use their ships. The military situation was simple. An American squadron, consisting mainly of two armored cruisers and five battleships, had bottled up a Spanish force of four cruisers and two torpedo boats. To save coal while on blockade, captain after captain had cut down on the number of boilers in operation. In the two armored cruisers, half the engines had been uncoupled from the propeller shafts to save coal. When the Spanish came out of the Santiago Channel Sunday morning, July 3, 1898, the Navy was caught by surprise. All the Spanish ships in the battle were sunk or run aground; victory was won. Yet an analysis of the results showed little cause for complacency.

The engines of the entire fleet should have been prepared for battle, but only the Oregon had been ready. She had won her place in American history by her dash from Bremerton, around Cape Horn to Cuba in a voyage which had been an engineering triumph. After the Oregon joined the blockade, her captain sent for his engineer, Robert W. Milligan. He urged Milligan to cut down on the number of boilers. Milligan replied that he would obey such an order—provided it was made in writing, and provided he could submit a written protest. In Milligan's words: "Damn the economy, efficiency is what we want." The captain withdrew his suggestion. Milligan used his coal carefully, but he kept fires lit under all his boilers. When the battle came, the Oregon was one of the few vessels the Spanish could not outrun.

Milligan was one of those old-fashioned engineers who was never far from his engines. He was one of that breed of men taught by experience. These engineers—and I proudly and with no false humility class myself with them—could walk through an engine room and, through the din and uproar, catch the slight sound of a component out of adjustment. They could touch a jacket of metal and feel from the vibrations whether the machinery inside was operating well. They would taste boiler water to see if it were pure, and would dip their fingers into the lubricating oil to find out if a bearing was running hot.

Milligan also gave responsibility to his young subordinates. In the Oregon, during her trip around South America and during the Battle of Santiago, Naval Cadet William D. Leahy served in the engine room. There he stood watches, was in charge of stowing coal, and clambered over boilers and furnaces to inspect and maintain them. Leahy, one of the outstanding naval leaders of World War II, could have received no better example of professional leadership.

It took time to learn the lessons of the Spanish-American War. The shooting at Santiago had been poor. Of all the shots fired, only 1.3 percent hit the target. Fortunately, enough hits were made to set the Spanish cruisers on fire. Three years later—in 1901—the North Atlantic Squadron, consisting of three battleships, fired at a hulk 78 feet long and 30 feet high at ranges of about a mile and a half. Despite ideal weather, only one out of 185 shots hit the target. As the admiral commanding the squadron reported, it was a "percentage of only 54/100 of 1%."

There are several explanations for this bad showing, including poor training and badly designed gun mounts and sights. Perhaps the record wasn't much worse than that of other navies at this general time. But these are excuses. The proper question was then—as it is today—how well did the Navy do compared to what it should have done?

The Spanish-American War temporarily interrupted a move which would have straightened out the place of the engineer aboard ships.

George W. Melville, Chief of the Bureau of Steam Engineering, spoke for the engineers when he complained to Congress: "I have got tired of being the bastard . . . son of the Navy."

Two solutions were possible. One was to strengthen the engineers so that their status and responsibilities were clearly defined and recognized. The second was to merge the engineers into the line. Because of the increasing complexity of ships, the Personnel Act of 1899 followed this second approach. As Assistant Secretary of the Navy, Theodore Roosevelt said: "Every officer on a modern war vessel in reality has to be an engineer whether he wants to or not." But, as Melville pointed out, the Act would only work if the line officers accepted their engineering responsibilities at sea in good faith.

Some did, others did not. In 1905, a boiler explosion aboard the gunboat Bennington, at anchor in San Diego harbor, cost 65 lives. Subsequent investigation revealed that the chief engineer was an ensign who had never stood an engine room watch before being assigned to the billet. He knew nothing of machinery, and he did not have the technical knowledge to stop the chain of events that led to the tragedy. He had never been required, nor given the opportunity, to acquire the necessary knowledge. The Bennington disaster was an extreme example of how far some line officers had yet to go to recognize the need for proficiency in engineering on board ship. The old way was simply not good enough.

Captain Bradley A. Fiske, testifying in 1908 before the Senate Naval Affairs Committee, made a telling point, as true today as it was then: "A navy, after all, is nothing but a collection of machines, operated by men. Men are always men. They do not change very much, but machines change a great deal."

The year in which Fiske spoke was during a period of naval reform. The United States was well on its way to becoming one of the great powers. Yet most of the new naval technology was being copied from abroad. The lead in developing the Dreadnought-type of battleship had been seized by the British; the first marine turbine was of British origin. Admiral William S. Sims, the officer who is credited with teaching our Navy how to shoot, used training procedures he had copied from the British. The Navy could also rely on American industry as another source of technology. Although this was a period of rapid growth, there was a serious weakness. The status of the engineer aboard ship was by now satisfactory, but the importance of the design engineers—those who could design ships and machinery—had been forgotten.

By 1916, the Navy recognized it could no longer neglect the design engineer. That year Congress passed an act which established the engineering duty only officer—usually abbreviated as EDO. The Act reflected the controversy that had troubled the Navy for decades. The EDO's were line officers, but specialized in design engineering. Because they could not assume military command, they were known as "restricted" line officers.

The Navy learned little from World War I. Even though the Germans had come close to victory with the submarine, we took little heed of that danger after the war. Instead, we held fleet exercises in which battleships steamed in formation and maneuvered, just as they had at the Battle of Jutland in 1916. In these exercises our submarines were used on the surface to protect the battleships. Again, as we later learned at the outset of World War II, the right questions were not being asked.

One reason was, instead of devoting full time to the condition of our ships, top Navy officials also spent time on unimportant matters. As an example, between World Wars I and II the Secretary of the Navy promulgated a General Order—the highest type of official directive that can be issued—concerning the Navy's homing pigeon establishment. This Order divided responsibilities for the care and operation of pigeons among the Bureau of Engineering, the Bureau of Construction and Repair, the Bureau of Navigation, and the Director of Naval Communications. All these organizations were involved in pigeons at one time or another. Their responsibilities included, among other things, pigeon population and banding, transportation, housing and food. There were also plans and literature concerning the pigeon service, miscellaneous equipment, and other pigeon problems.

The pigeon service has now been abandoned by the Navy. That, along with the disbanding of the last detachment of Indian Scouts in 1943, and the requirement for Army aviators to wear spurs in 1938, is one of the rare occasions in U. S. military history where a function has been abolished.

Today—with the inflated rank in the Navy—if we still had the pigeon service—the senior pigeon in the pecking order would, I suppose, be a line admiral. It would be claimed, as the argument so often goes, he needed this rank to deal effectively with his peers in the Army, the Air Force, and the other foreign pigeon services.

Between World Wars I and II, there was a reasonable balance among the line officers and the technical officers responsible for design and construction of ships. Few new ships were built immediately after World War I, so that line officers had a chance to learn how to use battleships, destroyers, submarines, and to experiment with aircraft carriers. The EDO's, in turn, had time to become educated in their profession. They were selected from line officers who, after six or seven years of sea duty following graduation from Annapolis, had been ordered to the Naval Postgraduate School at Annapolis for a course in naval engineering design. The latter part of this course was taken at a first-rate civilian college, such as Columbia or the University of California. After completing their two years of scholastic work, these officers returned to sea duty. Only several years later were a few of them designated EDO's. By that time they had about 15 years of commissioned service. Consequently, when the Navy began to rebuild in the 1930's, it had a group of able line officers—among them King, Halsey, Leahy, Nimitz, and Spruance—and some able engineers and constructors—among them Bowen, van Keuren, Cochrane, Robinson, and Mills—with the technical competence to meet its needs.

The Navy was at its apogee at the end of World War II. Again we were misled by the magnitude of the victory. The United States could afford to overlook errors of leadership in the line and in engineering because we had the time and resources to outproduce the enemy. Today this is no longer true. We must be ready to defend ourselves with what we have.

Since the end of World War II, I have witnessed the deterioration of the technical competence of the Navy when compared to the job the Navy has to do. One reason is lower personnel standards. Many officers who came into the Navy during the war had reached fairly high rank. They had served their country well, but lacked the qualifications the Navy needed in its officers. The decrease in personnel standards led to a decline in standards of competence. In the non-nuclear surface ships, officers were— and are at this moment —no longer required to qualify as operating engineers.

In the period before World War II, line officers were required to complete a formal qualification in the operation of the engineering department of their ship. Since World War II, the Navy has ignored the need for line officers to acquire operating experience in engineering. There are now no requirements for the captain of a ship to have served in the engineering department before he takes command. The result is that many captains have little knowledge, respect, or regard for their engineering plants; they do not know how to make a critical inspection of these plants, nor can they even evaluate the recommendations of their people. Is it any wonder that ships——even new ones ——are frequently found in poor material condition by outside inspectors?

The emphasis on operational engineering experience is just the opposite in nuclear ships. Since the beginning, I have required all nuclear ship captains, as well as their subordinate officers, to qualify as operators of the propulsion plant before being assigned to a ship. Prior to being assigned as chief engineer, executive officer, or captain of a nuclear ship, the nuclear trained officer must successfully complete a comprehensive eight-hour written examination and a three-hour oral examination at my headquarters in Washington. I personally approve or disapprove all examination results. Before he is permitted to take this examination, he must first have completed one year of academic and operational training which includes qualification as a watch officer on a fully operational, land prototype nuclear propulsion plant similar to the ones we have at sea. An engineering department officer, once he has completed his initial training, must qualify as a watch officer in a nuclear ship and serve in the engineering department for at least one year. To be eligible for the examination, he must also be recommended by his commanding officer.

These requirements produce line officers who are familiar with the operating details of their propulsion plants and are not afraid to get their hands dirty. When reports from subordinates conflict, or where they doubt the accuracy, they know enough to look for themselves and to put the weight of their own experience behind the decision. They also know how to train their officers and men and inspect their plant. They possess that essential requisite of leadership— to educate and train. I would much rather have officers with this sort of experience than ones with postgraduate degrees in systems analysis, computer science, management, or business administration—as many of the Navy's line officers have. The machinery does not respect these irrelevant capabilities.

In the rest of the Navy, engineering at sea has been relegated to a subordinate position. This is a serious mistake. Ships will not be able to fight effectively if they cannot get underway, or otherwise meet their operational requirements.

Despite the vast increase in technology, the Navy, also, has gone downhill in the areas dealing with ship design and construction. The

Bureau of Ships, which inherited these responsibilities when it was established in 1940 by the amalgamation of the Bureau of Construction and Repair and the Bureau of Engineering, failed to take steps to maintain a strong cadre of competent officer and civilian engineers who could control the increasing technical work-load and build a strong engineering organization able to meet the demands of the new technologies.

I cannot overemphasize the importance of the technological factor. For man to take full advantage of modern technology, he must raise his standards of knowledge and performance. The high temperatures, pressures, and speeds needed today require the use of metals close to their ultimate limits. Therefore, the utmost care is needed in the engineering, manufacture, installation, and operation of equipment aboard ship, and in the design and construction of the ship itself. The rising tide of technological complexity has engulfed the design engineer ashore as well as the line officer engineer at sea. In both areas, these men now face demands far beyond those which confronted their predecessors. In the face of these challenges, some of the senior EDO's have seemed to be more concerned with getting the perquisites of military command of Navy yards rather than running the technical aspects of their jobs.

To meet the demands of the technological revolution we had witnessed since World War II, the Navy had two choices. It could make the strenuous effort needed to keep abreast of technology. Or it could let technical competence fall from its grasp; placing its dependence on industry, tinkering with its organization and, through various makeshift arrangements, attempt to keep track of the technical developments upon which its future depended. The decision was to rely on reorganization and management techniques. The result was a flood of studies and an endless series of reorganizations, all of which increased emphasis on "management" and decreased the reliance on technical competence.

A chief characteristic of the reorganizations was the increasing influence of the line officer in technical matters. The line officer does have an important responsibility to think through and set the requirements for ships and weapons. But in the years since World War II, he has become deeply involved in making decisions on technical matters for which his training has not qualified him. Instead of deciding what he needs, he is now often deciding how his needs shall be met.

Up through the Civil War and beyond, there was absolute civilian control in the Navy. The Secretary of the Navy had the responsibility for promoting officers, for assigning them to commands, and for directing ship movements. Bit by bit the line officers managed to obtain some authority in these areas. A Secretary of the Navy in the time of Theodore Roosevelt complained: "My duties consist of waiting for the Chief of the Bureau of Navigation to come in with a paper, put it down before me with his finger on a dotted line and say to me, 'Sign your name here.' It is all any Secretary of the Navy does." This powerful bureau chief was a line officer. Finally, in 1915, the line officers achieved their goal of controlling the military operation of the Navy through the establishment of the Office of the Chief of Naval Operations.

When Congress established that position, it was clearly understood that the Chief of Naval Operations—the Navy's highest ranking military officer—was subordinate to the Secretary of the Navy, and that his job was to prepare the Fleet and keep it ready for war. He could give recommendations on the shipbuilding program, but not make the decisions. He did not control the technical bureaus which were concerned with ship design and construction; the chiefs of these bureaus reported directly to the Secretary. The Navy was divided into what was called a bilinear organization. One line of authority and responsibility, that for operational matters, extended from the Secretary to the Chief of Naval Operations. The other line extended from the Secretary to the chiefs of the bureaus. Ship design and construction were handled by the Chief of the Bureau of Ships who reported directly to the Secretary. Occasionally a Chief of Naval Operations attempted to expand his power over the bureaus. Admiral King tried to do so during World War II. President Franklin D. Roosevelt at once saw the issue. Roosevelt was no novice in naval affairs. He had been Assistant Secretary of the Navy from 1913 to 1920 – not only a long period of time, but also during the years of World War I. The President gave as his reason for opposing King that:

> "We ought not to have all the administrative problems of personnel and material, shore establishments, production, etc., go up through the Chief of Naval Operations. When you come down to it, the real function of the Chief of Naval Operations is primarily naval operations—no human being can take on all the responsibilities of getting the Navy ready to fight. He should know all about the state of that readiness, and direct the efforts of it, . . . If they are not ready to fight, or are slow in getting ready, it is his function to raise hell about it. Details of getting ready to fight ought not to bother him."

And, mind you, this was said when the Navy had not yet reached a fraction of the technical complexity it has today.

Roosevelt clearly understood the distinction between the role of the line officer and that of the technical officer. Unfortunately, some of the policy makers who came later did not.

At the time Secretary McNamara took over the Defense Department in 1961, there was a dire need to reform the Navy's method of handling development, procurement, and maintenance of warships. The basic need was to establish groups of technically competent people with clear authority and responsibility for executing the various Navy programs, similar to the strong technical management approach that prevailed in the nuclear propulsion program and later in the POLARIS missile program. There was also a need for strong technical groups in the shipyards and industrial contractor organizations to carry out the technical development work, under close technical direction from the Government headquarters organization. These needs were not being met.

The Navy, obviously, had not done a good job, so when Secretary McNamara took office, the Navy was, quite properly, investigated and much was found in need of improvement. Unfortunately, the changes he made were in the wrong direction. He took the advice of analysts and management experts rather than seeking the advice of people with technical expertise. He changed the administration of the Navy's technical work to coincide with the Air Force organizational method; he established the Naval Material Command—a Command to be responsible for the design, development, and procurement of all naval equipment and the supporting shore establishment—to be similar to the Air Force Material Command. He did not recognize that procurement of warships is a far different matter than procurement of aircraft. He appointed a line officer as the Chief of Naval Material. He eliminated the technical bureaus and assigned their functions to new "Systems Commands" under the Chief of Naval Material. Most of the technical people in the Bureau of Ships—other than in my nuclear propulsion organization— were removed to a new Naval Ship Engineering Center located in an outlying area, which was established as a field activity of the Naval Ship Systems Command. They are now merely consultants and are no longer responsible for what happens.

This reorganization, which created a new bureaucracy now grown to about 800 people—the Office of the Chief of Naval Material—added another huge layer of management between the technical people who have to deal with the engineering details if they are to get the job done, and the people in charge whose approval must be obtained to proceed. They are empowered to ask any and all questions and to stop the work from proceeding. Their endorsement must be obtained prior to forwarding a recommendation to higher authority in the chain of command. But there is no one that I can find in the Naval Material Command who has the authority to approve proceeding with programs.

Subsequently, the organization was again changed to have the Chief of Naval Material report to the Chief of Naval Operations rather than directly to the Secretary of the Navy, thus ending the bilinear organization of the Navy.

That change, which President Roosevelt had prevented in 1942, was supposed to keep the Chief of Naval Operations in the responsible chain of command. However, the net effect on the technical people was to add still another layer of management through which to fight proposals before they could get approval. To understand the overwhelming and detrimental effect of these changes, it must be realized that every officer and civilian in the Offices of the Chief of Naval Material and the Chief of Naval Operations regards himself as senior to the Commanders of the technical Systems Commands, and feels free to introduce his thoughts, questions, and desires into any technical matter coming through his office. These people involve themselves in every aspect of ship design, construction, and procurement, including the construction of shore facilities and settlement of contract claims.

Recently, serious consideration was even given to placing a line officer in charge of the Systems Command which is responsible for the design and construction of all warships. If that move had been carried out, it would have marked the final takeover by the line officers of every aspect of naval technical work. At the last moment, that proposal was fortunately abandoned.

The staff of the Chief of Naval Operations (CNO) has grown in recent years, until it now includes 65 admirals. This is about twice as many as were assigned to Fleet Admiral King's staff at the height of World War II. In addition, the CNO staff has more than 300 captains in comparison to only 187 billets for captains to command all ships and squadrons at sea. There are also over 320 commanders on the CNO staff, as well as many senior civilians and lower-ranking officers. These staff officers get involved in technical matters for which they have no qualifications. Recently, I attended a CNO meeting at which the only subject discussed was technical ship characteristics. In addition to the large number of line admirals present, there was also a Marine general—although the meeting had nothing to do with the Marine Corps. He volunteered no comments; how could he?

The purpose of the Navy has become lost in its organizational complexity. New layers of administrators and managers, civilian and naval, are interposed between the high echelons of the Navy and the people who are doing the actual work—the hewers of wood and drawers of water. The Navy no longer has adequate in-house technical capability. There was far greater technical competence in the Bureau of Ships in 1939 for the job it had to do to prepare for World War II, than there exists now to meet the needs of today.

The growing dependence upon management systems has been another characteristic which has evolved in the years since World War II. Secretary McNamara, instead of requiring the Navy to build up its in-house technical capability, decreed that it should depend on industry. The Navy could "manage" the projects which it assigned to industry. His successors have followed the same path. I have learned from many years of bitter experience that we cannot depend on industry to develop, maintain, and have available a technical organization capable of handling the design of complex ships and their equipment without the Navy, itself, having a strong technical organization to oversee the work in detail.

Management systems are as endemic to the Government as the Black Plague was in Medieval Europe. Brochure after brochure crosses my desk offering seminars and courses in management. Usually these are aimed at Government officials. Details vary, but the substance is the same. For a substantial fee, paid by the Government, and for a few days spent in pleasant surroundings, those attending the seminars will be taught management. Usually the agenda contains numbers: seven trends of management, five differences between a leader and a manager, four functions of a leader, five ideas for improving human relations, and three basic situations. There are gimmicks. I have a pocket-sized plastic card, complete with different colored eggs and long-sweeping arrows and fine print. Problems go one way, decisions another, and plans in yet a third direction. Presumably a person, faced with a decision, has only to pull out this card and follow the arrows. That is if he has the time and the patience, and can comprehend it. I can't.

A management system is broad and sweeping in its generalities. But technical problems are a matter of detail. The devil is in the details. Management systems cannot help when the difficulties are technical. A badly designed machine on which the safety of the ship and its crew may depend, is impervious to the blandishments of a management system.

But a badly designed machine will yield to an exhaustive analysis by a technically trained man.

What if Columbus had applied modern management systems to his proposed voyage? He would have attended management seminars. He would have studied tables with brightly colored squares and broad arrows to show which way plans, decisions, and problems were to go. He would not have bothered with details such as navigation and seamanship. These were technical matters. He would simply have "managed" the voyage. He would have used a colored-plastic decision-making card. Further, his analyst—I mean systems analyst—would have presented him with several volumes proving that the venture was not cost-effective. America would never have been discovered. We would all be Indians.

It is hard to describe how pervasive management systems are; how they have dulled the sharp edge of purpose and competence. Nor are line officers the only ones to depend on the teachings of modern management. A recent Chief of the Bureau of Ships told his engineers that their key role was management in a technological revolution. He did not deny the need for technically trained people, but stated that management was the job of engineering officers in Washington. Moreover, he noted approvingly that engineers, more used to dealing with verifiable facts, had participated in courses to enable them to deal efficiently with unpredictable human beings. In my experience, there are not many facts in a rapidly advancing field. Finding out what they are consumes all the time of a good engineer.

It is upon knowing these technical facts that the Navy depends—not upon people taken from their jobs to become skilled at human relations.

Management systems have a vogue. Not too long ago the PERT system had a great vogue in government and industry. PERT is an acronym for Program Evaluation and Review Technique and was developed within the POLARIS missile program. Several business journals hailed the system as a totally new management tool. It was even welcomed by some engineers. Nothing is heard of it today. A political scientist analyzing the POLARIS program concluded after several interviews that PERT was a sham. It was simply used to get political and financial support. Why was it welcomed so loudly and accepted so widely? How was it that so many business and industrial leaders adopted a system they later found worthless? Recently, I proposed to the editor of a leading business journal that this question was well worth his study. My suggestion was serious. For, although a system may wither away, it leaves a residue. And another system comes along.

Management is taught at Annapolis. This has done serious harm to its young graduates. My people and I interview midshipmen before they enter the nuclear program. We do this because it takes time, effort, and expense to train an officer to operate nuclear ships. We cannot afford to penalize men who are working hard to learn atomic power plant technology by wasting our resources on individuals who have been taught the easy social science courses, or who cannot or will not make demands upon themselves.

We must also select men who will seek facts and face them. Officers in nuclear ships cannot rely on theory alone. One midshipman, who had taken management courses, told me that he was able to learn my job in six months; he could run General Electric in a year.

It was not his fault. It was no crime for him to give this answer. He had been taught by his supposedly responsible and knowledgeable professors that his job was to "manage." It will take some of these men years to unlearn the Annapolis social science propaganda, and some never will. What is tragic is that often these young men have good potential as naval officers. They report to the Academy expecting to be taught the elements of the naval profession and have no reason to expect otherwise. Instead, they learn that a naval officer shouldn't bother with technical details. All he needs to know are broad concepts on how to manage. Someone else will do the work. There will always be available to him a sufficient number of cheerful, willing, competent, hard-working "serfs" to do the technical work, as well as the money to do the job. He will be the leader, the aristocrat.

There exists a great temptation in a man's life to commit himself to the dogma of his youth, and to base his entire life's work on that dogmatic foundation. This temptation is fostered by the cult of management, and this is why management studies should be banned from the Naval Academy. Many of its graduates, leading the sheltered naval life, never reexamine this doctrine; never afterward do they fully experience the world of reality.

They would be totally lost if suddenly the dogma handed down should prove to be fallacious.

Though we may stop asking questions the day we obtain our diplomas, the Navy we are committed to serve and enhance will not. It keeps asking us whether we know what we are doing; it keeps asking us why the Navy we have desired and built over the past 50 years is in its present state.

The service academies once gave professional education in engineering. Early graduates of West Point did much to develop our waterways and our railroads. In fact, for many years West Point was the only school that taught civil engineering. After some uncertain beginnings, Annapolis, too, gave good engineering and professional courses. The curricula of the academies was based on the assumption that the military service was a profession, but since the end of World War II, Annapolis, at least, has changed. It has added more and more social science courses so that it now produces men more fitted for civilian life—if even for that—than for a career in the Navy. Even rewards for scholastic ability do not lead midshipmen further toward their careers. I recently learned of a midshipman who will spend his senior year studying "The Effects of Low Frequency Electromagnetic Fields on the Circadian Biorhythms of Common Mice." We are raising a generation of naval officers who are ill-equipped to carry out their jobs in peace or war. Again, it is a question of purpose. What is Annapolis for? Does a naval officer need to know the rhythms of mice?

Nor are engineering and science adequately stressed as undergraduate requirements for many other young officers entering the Navy today. The Naval Reserve Officers Training Corps (NROTC) which annually supplies more new officers for the Navy than the Naval Academy, is a case in point. Over the years officers commissioned through this program have been allowed to pursue practically any undergraduate major they desire. The Navy therefore finds itself subsidizing prospective anthropologists, foresters, sociologists, or perhaps even landscape architects—skills not needed by the Navy. To pay for this training is a waste of Navy funds.

Young officers today must be able to understand the technical details of their equipment and they cannot do this without learning the fundamentals of engineering and science. I have been recommending for years that, as a minimum, all NROTC students be required to take mathematics through integral calculus and at least one year of college physics. Despite these efforts, I have only been partially successful in convincing those responsible that this should be done.

There are also signs that the Naval War College has lost its sense of purpose. That college was founded in 1884 to give a few naval officers a chance to think about strategy. But today strategy is one among other themes. For example, in the Naval War College Review of January, 1972, the lead article was entitled "A Revolution in Organization Concepts." A single sentence sums up the author's philosophy: "A person's ability to manage his own affairs or those of any public or private organization or institution depends less on the methods, techniques, and tools he employs than on his understanding of, and attitudes toward, the world that contains him and the groups of which he is a part." Put another way, he is saying that an attitude is more important than knowing the details of a job. The article's author has taught in several colleges here and abroad, and at one point was a professor of city planning and a co-author of a book on management. But would you go to a doctor who believes his "world outlook" is more important than his medical knowledge?

Contrast this philosophy with that of another article in the same issue of the Review. It describes how Admiral Joseph Mason Reeves, who was Commander of the United States Fleet in 1934, gathered officers of all ranks for a lecture at the War College. He told them: "In everything we do, we must ask ourselves: does this directly advance preparation for war? . . . . If war comes, this Fleet must fight 'as is.' You must fight at sea and not on paper." These two examples from the Review go to the heart of the matter—one is professional advice from an experienced naval officer; the other is not.

The Navy is raising a generation of officers who believe that technical training is not essential and that they can rely on management techniques to make decisions. For these officers, the road to advancement in many cases leads through the non-professional areas of the Navy, such as political-military affairs, foreign sales, planning and budgeting, human relations. Further, they want subordinates with whom they can be comfortable rather than those who are qualified. On the other hand, the Russians do not put management experts into highly technical positions. A recent Soviet listing indicates that the head of the Russian space program is a design engineer who has been associated with Soviet rocket development since World War II.

The dependence on management systems has been an important factor in the loss of technical competence in ship design and construction. For example, over the years, with monotonous regularity, representatives from large and well-known companies propose to undertake—at Government expense—studies of small, high-speed ships propelled by small, cheap, light-weight nuclear power plants. These proposals are enticing to officer managers who do not understand the technical flaws, and are swayed by the miraculous achievements promised by these representatives—with their high-sounding management titles—who seek Government contracts. The officers are dazzled by titles because they have been accustomed throughout their career to regard rank and title as the measure of competence.

My people and I find that the technical bases for these proposals are unsound. When we object to these schemes on scientific and engineering grounds, we are told that we are unimaginative and stubbornly conservative, that we could make these systems work if we really tried and wanted to do so. Such an argument reduces all engineering to the simple matter of personal will. We are constantly faced with people who believe in the idea of overcoming existing difficulties by trying something even bolder and more difficult. Like all exaggerated gallantry, such a course is attractive but unrewarding.

Senior line officers have lived most of their lives in an operating environment where they issue orders to which they obtain immediate execution by their subordinates. When they assume command of a technical organization, they become frustrated when the response to their directives is inadequate or delayed.

I well remember when, many years ago, a senior line admiral issued a directive which said "There will be no more rust." They do not understand that technical directives are not self-executory, because they involve far more than compliance with the type of order required to change ship course or speed. Such a directive may require a large amount of engineering work and take much time and the work of many engineers; it may not even be possible of achievement. Nor do they understand that a complex engineering directive requires more than a management decision; it requires also a strong technical organization to carry it out.

The most important job of the man in charge of a technical organization is to select and train the technical people working for him—not to issue orders and directives. But to do so he, himself, must be technically competent. No one, no matter how high his position, can accomplish a technical aim by simply ordering it. Nature knows no rank.

The loss of professionalism among the engineers, and the interference of line officers in technical matters, has resulted in naval ships of questionable design. I do not include our nuclear ships in this category—but only because of my ability to insist upon the contrary.

If the acceptance of unsound proposals illustrates the technical poverty of those officers and civilians in the Navy who are managing technical projects, the 1, 200 pound boiler is an example of incompetence on board ship. The Navy has had difficulty with these boilers, which deliver steam at a pressure of 1, 200 pounds per square inch. They have been hard to operate, and men have lost their lives in accidents with them. These boilers are important because well over one hundred of our escort ships and seven of our thirteen aircraft carriers are fitted with these boilers. Consequently, when the Navy had trouble with them, a significant number of important ships were involved.

My organization discovered that at the basic school ashore, the sailors were being trained to stand watches on, and record the water level of a boiler that had no water in it. This is the equivalent of teaching your sons and daughters to drive by letting them sit in the garage behind the wheel, but never turning on the engine or putting the car in motion. And then sending them out on the highways to earn their living as truckdrivers. On board escort ships, we found commanding officers who had never given the boilers priority. I talked to admirals who were responsible for the care of these ships, yet had never seen the boilers which were giving them so much trouble—and a number of these ships could not operate.

What is the condition of the ships in our Fleet? In my opinion, there has been no period in the past 50 years where the Fleet has been in as poor condition as it is today. This is often excused because of the Vietnam War and the inadequate appropriations for shipbuilding and ship repair. It appears to me that the prime reason for the inability of the officers of the Fleet to supervise their equipment is their lack of training. The poor condition of the Fleet is well-documented in official reports of the Board of Inspection and Survey of the last few years.

I have gone into the historical background to show that the problems the Navy is facing today are not new. More often than not, the line officers and the engineers, aboard ship or ashore, have been in conflict. Nothing I have said is intended to give the impression that engineers do not make mistakes. But engineers are less likely to make mistakes in engineering than line officers who make engineering decisions. The pendulum has swung too far in the direction of the line officer. I would be just as disturbed if the balance favored the engineer. The issue is not whether one group is exalted over the other; the issue is the very purpose of the Navy. On October 15, 1912, President Taft said: "A navy is for fighting, and if its management is not efficiently directed to that end the people of the country have a right to complain."

What Taft said in 1912 applies today. So does Roosevelt's statement made fifteen years earlier: "Every officer on a modern war vessel . . . has to be an engineer . . . ." Defining purposes is deceptively easy. Setting standards is not hard. What is difficult is to keep them firm—to prevent them from being eroded by people more interested in their careers and their status than in the organization. This is a hard lesson to learn.

Those who ask again and again the simple question: "Does this make sense ?" are accused of disloyalty. We should not be loyal to the idea of loyalty. We should be loyal to the purpose of the organization.

What should be done ? Here I can only draw upon my own experience. When I came to Washington at the beginning of World War II, my job was to run the electrical section of the Bureau of Ships. Our object was to develop and supply electrical equipment for the Fleet. I found that one man was in charge of design, another took care of production, a third handled maintenance, while a fourth dealt with fiscal matters. This was the way the entire Bureau operated. But it didn't make sense to me. Design problems showed up in production, production errors showed up in maintenance, and financial matters reached into all areas. I changed the system. I made one man responsible for his piece of equipment—for design, production, maintenance, and contracts. If anything went wrong, I knew exactly where to look. I run my organization today upon the same principle. Our nuclear ships have to work. We have developed the technical knowledge to see that they do. We know that our responsibility extends for the life of the ship—from womb to tomb.

Reform of an institution rarely comes from within. Inertia and resistance are too strong from those who shelter behind the ramparts of custom or find comfort from the soothing narcotic of ritual. Occasionally the defense against new ideas takes strange forms. In 1897, Theodore Roosevelt was chairman of a board set up to reduce the number of senior line officers—a problem that is with us today, too. Promotion had been so slow that the upper ranks were filled with men who arrived too late in their life to learn how to exercise responsibility. A few officers on the board seriously proposed that the reduction be made by a system of chance—a sort of lottery—so that the choice of officers to be retired would be made "without the intervention of human intelligence." Roosevelt tossed the suggestion aside, for he and others saw that in this method the good officer was as liable to retirement as the poor one. He observed that intelligent men can make mistakes, but surely intelligence is better than blind chance.

Nearly all decisions in the Navy today deal with engineering problems. Technology will not stand still. The penalty for technological surprise can be enormous, even fatal. To avoid getting caught, we must know where the responsibility lies for the quality of our ships and the readiness of our Navy for war. We should return to the bilinear system, in which the technical bureaus reported directly to the Secretary of the Navy. They should no longer report through the Chief of Naval Material to the Chief of Naval Operations. The entire office of the Chief of Naval Material with its huge staff should be recognized as the huge burden it is, and disbanded. Not only would this step relieve those engaged in technical work from unnecessary meetings and paperwork, it would allow the Chief of Naval Operations to cut back on the size of his office. He could then face his primary job: seeing to it that the Navy is ready for war.

The principle behind these actions is that line officers must be taken out of technical positions they are not qualified to hold. The line officer has become an aristocrat. If an aristocracy fills a need in society, it has a valid place. But if it arrogates to itself privileges without responsibilities; if it assumes responsibilities without the necessary qualifications; then an aristocracy is dangerous, not just to itself, but to the society of which it is a part. The aimless way in which the line officers have taken over engineering in the Navy in the last ten years has just about destroyed the engineering capacity of the Navy.

Members of the inner circle of the naval aristocracy have often been rewarded by receiving choice assignments no matter what their experience, or lack of it. The situation is similar to placing favorites and members of the nobility in command of armies, or to Pope Alexander VI making his son Caesar Borgia a Cardinal at seventeen.

Today, many of our naval leaders are actually "cheerleaders," making heroic attempts to keep the Navy together with endless exhortations and lectures on the value of leadership. Yet they, themselves, are not knowledgeable enough to instruct or to see that the work has been done properly. What we must recognize is that the purpose of the Navy is to defend the country, not to provide a place for comfortable careers. Because our officers are the cutting edge of our military strength, we can make no compromise with their ability.

After Pearl Harbor, President Roosevelt sent for Admiral King. Supposedly King remarked: "When they get into a war, they send for the sons of bitches." Whether King used these exact words or not, it is their spirit—the determination to cut through difficulties to get the job done—that is important.

The line officer has a professional responsibility to learn how to operate his ship and his fleet. From his experience, he should be able to say what kinds of ships the Navy needs to meet its obligations.

Translating those requirements into operational hardware is the job of the engineering officers and the civilian engineers. These men must be forced to learn their job and assume responsibility for their work. To do this requires long-term assignments. We can no longer permit officers to hold their position for a short time before moving on to their next job. The headquarters organization responsible for the design and construction of ships should be reestablished as a technical organization with its engineers returned to positions requiring them to be responsible for the technical state of affairs instead of being field consultants. As the Navy gains technical competence, it can build up its in-house technical capability, and demand high quality work at reasonable cost from the industrial contractors.

I do not underestimate the difficulties. It demands a clear recognition of purpose. It demands a leadership that knows that its main job is to train and educate officers and men to meet the highest standards at sea and ashore.

To a large extent, the Navy reflects the Department of Defense. Here, too, we are overwhelmed with a suffocating organization. In 1969, the Secretary of Defense asked a leading executive from private industry to serve as chairman of a committee to investigate the Department. Based on the work of his committee, the chairman wrote: "The Defense Department is the single most wasteful, incompetent, overstaffed department in the Government. It consists largely of paper-shufflers and memo-writers." He was right. As was to be expected, the recommendations of this board—like its innumerable predecessors—were not taken seriously. Boards and commissions are useless because they can only suggest. Frequently they are set up just to quiet criticism by showing that "action" is being taken. The government is littered with reports of boards and committees which have never been acted on.

Changes can only be made by those who are responsible and act responsibly. To cut through the thick underbrush of the paper jungle, the Defense Department in the 1960's tried systems analysis, program management, and cost effectiveness. McNamara and his "whiz kids," with their cost analyses and computer methods, "managed" us into the situation where we lost the lead we had in nuclear submarines. Had not Congress intervened at the last moment, we would have stopped nuclear submarine construction almost entirely. Even worse, these systems analysts recommended that we sink ten of our Polaris submarines as a cost-saving measure.

If at times the Navy Department has difficulty in fending off such proposals, one reason is that the Secretary of the Navy does not hold the position of esteem and importance he once possessed. No longer a member of the President's Cabinet, he is merely one of three service Secretaries who report to the Secretary of Defense.

Today we have new leadership in the Navy and the Department of Defense. I hope these men will give serious thought to reestablishing engineering competence in the Navy. I spoke earlier that we had misread our naval past. I study naval history from the perspective of an officer who is interested in the development of his profession. To me, most of these histories are seriously flawed. With a few notable exceptions, they are written by the victors to hail their own achievements. It is true in any walk of life that past success can engender a dangerous confidence and complacency that can lead to future defeat. In the glow of victory, all error is forgotten.

Recognizing the uncertainty of tomorrow is an important attribute of leadership. But a leader is acting in his highest capacity when he recognizes that his primary function is to train and educate. Naval officers cannot exercise true leadership if they lack the sense of purpose that comes from competence. No classroom courses and no books on leadership can take its place. There is no broad and easy highway to leadership, but only the long road of experience gained through hard and unremitting work at one's career.

When I am told that I should not attack any of the policies of the Navy Department, it is the same as saying that a son should not warn his mother of a cliff until she has fallen over it. Perhaps, in the end, the facts of life, like a sheepdog with an awkward flock, will finally nudge the Navy toward common sense. But I doubt it. Had I refrained from attacking the policies of the Navy Department over the past 25 years and not gone to Congress and the Atomic Energy Commission, we probably would not now have our nuclear Navy which is a prime factor in keeping war from this country.

Like the philosopher who came to the ancient city, I know that reform means progress, and progress means strife. Where there is no friction, there is no motion. It has always been this way. We must ever seek the purpose of our lives. We must not give in to despair over the state of our technological competence as it is today. The danger lies in the future; it can be averted if we will but act.

It is not the duty of the critic to become responsible for correcting the deficiency he has found. This argument is frequently used to prevent the critic from pointing out what is wrong. When Eurystheus discovered that the Augean stables were dirty, was he then obligated to clean them? Has not the cruiser on the scouting line performed its duty when it reports the presence of the enemy fleet?

Unpleasant facts are unwelcome and no one builds statues to critics. But today we are not quite as impatient of a critic as the ancient Locrians. These people gave freedom of speech to all citizens. At public meetings anyone could stand up and argue for changes in law or custom, on one condition. A rope was placed around his neck before he began to speak and, if what he said did not meet with public approval, he was forthwith hanged. That, no doubt, prevented disturbing the even tenor of familiar customs and ways of life. I have encountered some in the Navy who look with nostalgia on this ancient custom.

But we must face the stark fact that an uncriticized society cannot long endure.

Opening Remarks by Admiral H. G. Rickover, USN
Before the Subcommittee on Manpower and Personnel
U. S. Senate Committee on Armed Services

Monday, April 4, 1977

In ancient times a philosopher came to a city. He was determined to save its inhabitants from sin and wickedness. Night and day he walked the streets and haunted the marketplaces. He preached against greed and envy, against falsehood and indifference. At first the people listened and smiled. Later they turned away; he no longer amused them. Finally, a child moved by compassion asked: "Why do you go on? Do you not see it is hopeless?" The man answered: "In the beginning, I thought I could change men. If I still shout, it is to prevent men from changing me."

I feel like that man as I talk to you today. I have fought for reform in the Navy for years. If I still shout, it is because I am afraid the Navy will not be able to meet the demands which will be placed upon it in the future.

It is not uncommon for our military to spend time on unimportant matters. As an example, between World Wars I and II the Secretary of the Navy promulgated a General Order—the highest type of official directive that can be issued—concerning the Navy's homing pigeon establishment. This Order divided responsibilities for the care and operation of pigeons among the Bureau of Engineering, the Bureau of Construction and Repair, the Bureau of Navigation, and the Director of Naval Communications. All these organizations were involved in pigeons at one time or another. Their responsibilities included, among other things, pigeon population and banding, transportation, housing and food. There were also plans and literature concerning the pigeon service, miscellaneous equipment, and other pigeon problems.

The pigeon service has now been abandoned by the Navy. That, along with the disbanding of the last detachment of Indian Scouts in 1943, and the requirement for Army aviators to wear spurs in 1938, is one of the rare occasions in U. S. military history where a function has been abolished.

Today—with the inflated rank in the Navy—if we still had the pigeon service—the senior pigeon in the pecking order would, I suppose, be a line admiral. It would be claimed, as the argument so often goes, he needed this rank to deal effectively with his peers in the Army, the Air Force, and the other foreign pigeon services.

The staff of the Chief of Naval Operations has grown in recent years, until it now includes 65 admirals. This is about twice as many as were assigned to Fleet Admiral King's staff at the height of World War II. In addition, the staff of the Chief of Naval Operations has more than 300 captains in comparison to only 187 billets for captains to command all ships and squadrons at sea. There are also over 320 commanders on this staff, as well as many senior civilians and lower-ranking officers. These staff officers get involved in technical matters for which they have no qualifications. Once I attended a Chief of Naval Operations meeting at which the only subject discussed was technical ship characteristics. In addition to the large number of line admirals present, there was also a Marine general—although the meeting had nothing to do with the Marine Corps. He volunteered no comments; how could he?

Reform of an institution rarely comes from within. Inertia and resistance are too strong from those who shelter behind the ramparts of custom or find comfort from the soothing narcotic of ritual. Occasionally the defense against new ideas takes strange forms. In 1897, Theodore Roosevelt was chairman of a board set up to reduce the number of senior line officers—a problem that is with us today, too. Promotion had been so slow that the upper ranks were filled with men who arrived too late in their life to learn how to exercise responsibility. A few officers on the board seriously proposed that the reduction be made by a system of chance—a sort of lottery—so that the choice of officers to be retired would be made "without the intervention of human intelligence."

Today, many of our naval leaders are actually "cheerleaders," making heroic attempts to keep the Navy together with endless exhortations and lectures on the value of leadership. Yet they, themselves, are not knowledgeable enough to instruct or to see that the work has been done properly. What we must recognize is that the purpose of the Navy is to defend the country; not to provide a place for comfortable careers. Because our officers are the cutting edge of our military strength, we must make no compromise with their ability.

To a large extent, the Navy reflects the Department of Defense. Here, too, we are overwhelmed with a suffocating organization. In 1969, the Secretary of Defense asked a leading executive from private industry to serve as chairman of a committee to investigate the Department. Based on the work of his committee, the chairman wrote: "The Defense Department is the single most wasteful, incompetent, overstaffed department in the Government. It consists largely of paper-shufflers and memo-writers." He was right. As was to be expected, the recommendations of this board—like its innumerable predecessors—were not taken seriously. Boards and commissions are useless because they can only suggest. Frequently they are set up just to quiet criticism by showing that "action" is being taken. The government is littered with reports of boards and committees which have never been acted on.

Today we have new leadership in the Navy and the Department of Defense. I hope these men will give serious thought to reestablishing competence in the Navy. I said earlier that we had misread our naval past. I study naval history from the perspective of an officer who is interested in the development of his profession. To me, most of these histories are seriously flawed. With a few notable exceptions, they are written by the victors to hail their own achievements. It is true in any walk of life that past success can engender a dangerous confidence and complacency that can lead to future defeat. In the glow of victory, all error is forgotten.

When I am told that I should not attack any of the policies of the Navy or the Defense Department, it is the same as saying that a son should not warn his mother of a cliff until she has fallen over it. Perhaps, in the end, the facts of life, like a sheepdog with an awkward flock, will finally nudge the Navy toward common sense. But I doubt it. Had I refrained from attacking the policies of the Navy Department over the past 25 years and not gone to Congress and the Atomic Energy Commission, we probably would not now have our nuclear Navy which is a prime factor in keeping war from this country.

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FOR RELEASE 2:00 P.M. (EDT)
SUNDAY, MAY 13, 1979

THOUGHTS ON MAN'S PURPOSE IN LIFE

by
Admiral H. G. Rickover, U. S. Navy
at the Commencement Ceremony
of
Hampden-Sydney College
Hampden-Sydney, Virginia
Sunday, May 13, 1979

Voltaire once said: "Not to be occupied and not to exist are one and the same thing for a man." With those few words he captured the essence of a purpose in life: to work, to create, to excel, and to be concerned about the world and its affairs.

The question of what we can do to give purpose or meaning to our lives has been debated for thousands of years by philosophers and common men. Yet today we seem, if anything, further from the answer than before. Despite our great material wealth and high standard of living, people are groping for something that money cannot buy. As Walter Lippman said: "Our life, though it is full of things, is empty of the kind of purpose and effort that gives to life its flavor and meaning."

I do not claim to have a magic answer. But I believe there are some basic principles of existence, propounded by thinkers through the ages, which can guide us toward the goal of finding a purpose in life.

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Among these principles of existence, responsibility is the one which forces man to become involved. Acceptance of responsibility means that the individual takes upon himself an obligation. Responsibility is broad and continuous. None of us are ever free of it, even if our work is unsuccessful.

Responsibility implies a commitment to self which many are not willing to make; they are strongly attracted to accepting a course of action or direction for their lives imposed by an external source. Such a relationship absolves the individual from the personal decision-making process. He wraps himself in the security blanket of inevitability or dogma, and need not invest the enormous amounts of time, effort and, above all, the thought required to make creative decisions and meaningfully participate in the governance of his life.

The sense of responsibility for doing a job right seems to be declining. In fact, the phrase "I am not responsible" has become a standard response in our society to complaints on a job poorly done. This response is a semantic error. Generally what a person means is: "I cannot be held legally liable." Yet, from a moral or ethical point of view, the person who disclaims responsibility is correct: by taking this way out he is truly not responsible; he is irresponsible.

The unwillingness to act and to accept responsibility is a symptom of America's growing self-satisfaction with the status quo. The result is a paralysis of the spirit, entirely uncharacteristic of Americans during the previous stages of our history.

The task of finding a purpose in life also calls for perseverance. I have seen many young men who rush out into the world with their messages, and when they find out how deaf the world is, they withdraw to wait and save their strength. They believe that after a while they will be able to get up on some little peak from which they can make themselves heard. Each thinks that in a few years he will have gained a standing, and then he can use his power for good. Finally the time comes, and with it a strange discovery: he has lost his horizon of thought. Without perseverance, ambition and a sense of responsibility have evaporated.

Another important principle of existence which gives purpose and meaning to life is excellence. Because the conviction to strive for excellence is an intensely personal one, the attainment of excellence is personally satisfying. Happiness comes from the full use of one's power to achieve excellence. Life is potentially an empty hole, and there are few more satisfying ways of filling it than by achieving and exercising excellence.

This principle of excellence is one which Americans seem to be losing, and at a time when the Nation stands in need of it. A lack of excellence implies mediocrity. And in a society that is willing to accept a standard of mediocrity, the opportunities for personal failure are boundless. Mediocrity can destroy us just as surely as perils far more famous.

It is important that we distinguish between what it means to fail at a task and what it means to be mediocre. There is all the difference in the world between the life lived with dignity and style which ends in failure, and one which achieves power and glory, yet is dull, unoriginal, unreflective, and mediocre. In a real sense, what matters is not so much whether we make a lot of money or hold a prestigious job; what matters is that we seek out others with knowledge and enthusiasm—that we become people who can enjoy our own company.

In the end, avoiding mediocrity gives us the chance to discover that success comes in making ourselves into educated individuals, able to recognize that there is a difference between living with excellence and living with mediocrity.

Creativity is another of the basic principles of existence which I believe help to give purpose in life. The deepest joy in life is to be creative. To find an undeveloped situation, to see the possibilities, to decide upon a course of action, and then devote the whole of one's resources to carry it out, even if it means battling against the stream of contemporary opinion, is a satisfaction in comparison with which superficial pleasures are trivial.

To create you must care. You must have the courage to speak out. The world's advances always have depended on the courage of its leaders. A certain measure of courage in the private citizen also is necessary to the good conduct of the State. Otherwise men who have power through riches, intrigue, or office will administer the State at will, and ultimately to their private advantage.

To have courage means to pursue your goals, or to satisfy your responsibilities, even though others stand in the way and success seems like a dream. It takes courage to stand and fight for what you believe is right. And the fight never ends. You have to start it over again each morning as the sun rises. Sir Thomas More wrote: "If evil persons cannot be quite rooted out, and if you cannot correct habitual attitudes as you wish, you must not therefore abandon the commonwealth. You must strive to guide policy indirectly, so that you make the best things, and what you cannot turn to good, you can at least make less bad."

These principles of existence—responsibility, perseverance, excellence, creativity, courage—must be wedded with intellectual growth and development if we are to find meaning and purpose in our lives. It is a device of the devil to let sloth into the world. By the age of twenty, some of us already have adopted a granite-like attitude which we maintain throughout life. Intellectually, we must never stop growing. Our conscience should never release us from concern for the problems of the day. Our minds must be forever skeptical, yet questioning. We must strive to be singularly free from that failing so common to man, deplored by Pascal in the "Pensees," of filling our leisure with meaningless distractions so as to preclude the necessity of thought. To be an intellectual in the fullest sense, one's mind must be in constant movement.

Aristotle believed that happiness was to be found in the use of the intellect. In other words, ignorance is not bliss; it is oblivion. The inspired prayer does not ask for health, wealth, prosperity, or anything material, but says, "God, illumine my intellect." Man cannot find purpose in his life without expanding and using his intellectual qualities and capacities. Liberal learning is a primary source of these qualities. By liberal learning, I refer to discerning taste; wise judgment, informed and critical perspectives that transcend specialized interests and partisan passions; the capacity to understand complexity and to grow in response to it.

A cause of many of our mistakes and problems is ignorance—an overwhelming national ignorance of the facts about the rest of the world. A nation, or an individual, cannot function unless the truth is available and understood; no amount of good on the part of the leaders or the media will offset ignorance and apathy in the common citizen. Since the United States is a democracy, the broad answer is that all of us must become better informed. Reading is one method of accomplishing this purpose. By spending a few dollars for a book, the thoughts and life's work of a great man are available to us.

As a reader, man is unique among living things. The ability to read—and more broadly, the ability to express complex ideas through language—distinguishes him from all other life forms. Without language, complex thought is inconceivable and the mind is undeveloped. The inability to speak and write imprisons thought. In the same vein, sloppy, imprecise thinking begets sloppy, imprecise language. Language and thought are interconnected, and the written word is the vehicle which best advances both.

Therefore, I count reading, and its associated skill, writing, among the most significant of all human efforts. Good writing, after all, is simply the result of enormous reading, detailed research, and careful thought. It means studying to gain a good vocabulary, and practicing to learn how to use it. It seems to me that these kindred skills should be developed and nourished from the very first, if man is to grow intellectually. And unless he can express his thoughts well, he can exert little influence on his fellowmen.

I now will discuss one final principle of existence essential to man's purpose in life: the development of standards of ethical and moral conduct. God, it is generally conceded, has made a remarkable job of the physical universe but has, strangely, not done quite so well with the spiritual element. There is abundant evidence around us to conclude that morals and ethics are becoming less prevalent in people's lives. The standards of conduct which lay deeply buried in accepted thought for centuries no longer are absolute. Many people seem unable to differentiate between physical relief and moral satisfaction; they confuse material success in life with virtue.

We are now living on the accumulated moral capital of traditional religion. It is running out, and we have no other consensus of values to take its place. This is partly so because man can now obtain on earth what previously was promised him when he reached heaven.

In our system of society, no authority exists to tell us what is good and desirable. We are each free to seek what we think is good in our own way. The danger is that where men compromise truth and let decency slip, they eventually end up with neither. A free society can survive only through men and women of integrity. Fortunately, there still exist human beings who remain concerned about moral and ethical values and justice towards others. These are the individuals who provide hope of the ultimate realism that is marked by a society's capacity to survive rather than to be eventually destroyed.

It is important also to recognize that morals and ethics are not relative; they do not depend on the situation. This may be the hardest principle to follow in working to achieve goals. The ends, no matter how worthy they appear, cannot justify just any means. Louis Brandeis, who was deeply convinced of the importance of standards, said: "One can never be sure of ends—political, social, economic. There must always be doubt and difference of opinion." But Brandeis had no doubt about means. "Fundamentals do not change; centuries of thought have established standards. Lying and sneaking are always bad, no matter what the ends."

This is a very enabling statement. Life is not meaningless for the man who considers certain actions wrong simply because they are wrong, whether or not they violate a law. This kind of moral code gives a person a focus, a basis on which to conduct himself. Certainly there is a temptation to let go of morals in order to do the expedient thing. But there is also a tremendous power in standing by what is right. Principle and accomplishment need not be incompatible.

A common thread moves through all the principles I have discussed: It is the desire to improve oneself and one's surroundings by actively participating in life. Too many succumb to the emotional preference of the comfortable solution instead of the difficult one. It is easy to do nothing. And to do nothing is also an act; an act of indifference or cowardice.

A person must prepare himself intellectually and professionally, and then use his powers to their fullest extent. This view is well expressed in two extracts from I Ching, the Confucian Book of Changes:

> —The superior man learns and accumulates the results of his learning; puts questions, and discriminates among those results; dwells magnanimously and unambitiously in what he has attained to; and carries it into practice with benevolence.
>
> —The superior man nerves himself to ceaseless activity.

To find a purpose in life, one must be willing to act, to put excellence in one's work, and have concern for what is right ahead of personal safety. Life must be felt, not observed. But to do so means applying oneself to the task daily. Ralph Waldo Emerson said: "God offers to every mind its choice between truth and repose. Take which you please—you can never have both."

No professional man has the right to prefer his own personal peace to the happiness of mankind; his place and his duty are in the frontline of struggling men, not in the unperturbed ranks of those who keep themselves aloof from life. If a profession is to have its proper place in the further development of society, it must be increasingly dissatisfied with things as they are. If there is to be any exaltation in one's work, one must learn to reach out, not to struggle for that which is just beyond, but to grasp at results which seem almost infinite. As Robert Browning wrote, "Ah, but a man's reach should exceed his grasp, or what's a Heaven for."

Man's work begins with his job; his profession. Having a vocation is something of a miracle, like falling in love. I can understand why Luther said that a man is justified by his vocation, for it is a proof of God's favor. But having a vocation means more than punching a time-clock. It means guarding against banality, ineptitude, incompetence, and mediocrity. A man should strive to become a locus of excellence.

Most of the work in the world today is done by those who work too hard; they comprise a "nucleus of martyrs." The greater part of the remaining workers' energy goes into complaining. Employees today seldom become emotional about their organization or its output; they are only interested in making money or getting ahead. And many organizations are killing their employees with kindness, undercutting their sense of responsibility with an ever-increasing permissiveness. This is a fatal error. For where responsibility ends, performance ends also. Man has a large capacity for effort. But it is so much greater than we think it is, that few ever reach this capacity.

We should value the faculty of knowing what we ought to do and having the will to do it. But understanding is easy. It is the doing that is difficult. The critical issue is not what we know but what we do with what we know. The great end of life is not knowledge but action. Theodore Roosevelt expressed this concept well in his "Man in the Arena" statement:

> It is not the critic who counts, not the one who points out how the strong man stumbled or how the doer of deeds might have done them better. The credit belongs to the man who is actually in the arena, whose face is marred with sweat and dust and blood; who strives valiantly; who errs and comes short again and again; who knows the great enthusiasms, the great devotions, and spends himself in a worthy cause; who, if he wins, knows the triumph of high achievement; and who, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who know neither victory nor defeat.

The man in the arena has found a purpose in life. He daily experiences Emerson's declaration that nothing is achieved without enthusiasm. He knows that men seldom come within shouting distance of their hopes for themselves. Yet he does not quit in resignation as have those who have taken trouble with nothing except to be born. In his work he is buffeted from two sides, challenged by his own ideas which revolt at the compromises of reality, and assaulted by reality which fights the ideas. He spends himself in that struggle, and he wins by a constant renewal of effort in which he refuses to sink either into placid acceptance of the situation or into self-satisfaction.

I believe it is the duty of each of us to act as if the fate of the world depended on him. Admittedly, one man by himself cannot do the job. However, one man can make a difference. Each of us is obligated to bring his individual and independent capacities to bear upon a wide range of human concerns. It is with this conviction that we squarely confront our duty to posterity. We must live for the future of the human race, and not for our own comfort or success.

For anyone seeking meaning for his life, a figure from Greek mythology comes to mind. It is that of Atlas, bearing with endless perseverance the weight of the heavens on his back. —Atlas, resolutely bearing his burden and accepting his responsibility that gives us the example we seek.

To seek out and accept responsibility; to persevere; to be committed to excellence; to be creative and courageous; to be unrelenting in the pursuit of intellectual development; to maintain high standards of ethics and morality; and to bring these basic principles of existence to bear through active participation in life—these are some of my ideas on the goals which must be met to achieve meaning and purpose in life.

THIS SPEECH REFLECTS THE VIEWS
OF THE AUTHOR AND DOES NOT
NECESSARILY REFLECT THE VIEWS
OF THE DEPARTMENT OF THE NAVY
OR THE DEPARTMENT OF ENERGY

FOR RELEASE 9:45 AM(EDT)
WEDNESDAY, AUGUST 1, 1979

"ENVIRONMENTAL PERSPECTIVE"

BY

ADMIRAL H. G. RICKOVER, U. S. NAVY
AT THE 1979 ANNUAL CONVENTION
OF THE
INTERNATIONAL PLATFORM ASSOCIATION

WASHINGTON, D. C.
AUGUST 1, 1979

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I AM GREATLY HONORED TO BE THE RECIPIENT OF THE WINSTON CHURCHILL AWARD. I HAD THE PRIVILEGE OF MEETING THIS GREAT STATESMAN WHEN I VISITED THE HOUSE OF COMMONS IN THE EARLY 1960'S. I ADMIRED HIM GREATLY FOR HIS ACHIEVEMENTS AND BECAUSE HE WAS A SINGULARLY WARM-HEARTED HUMAN BEING.

I WANT TO THANK THE MEMBERS OF THE INTERNATIONAL PLATFORM ASSOCIATION FOR THIS AWARD AND FOR INVITING ME TO SPEAK HERE THIS MORNING.

LONG BEFORE THE TERM ENVIRONMENTALIST BECAME A HOUSEHOLD WORD, I WAS CONCERNED ABOUT OUR ENVIRONMENT. EARLY IN MY CAREER I BECAME CONCERNED THAT OUR NATURAL RESOURCES WERE BEING CONSUMED TOO RAPIDLY; THAT THE WORLD'S FINITE SUPPLY OF PETROLEUM WOULD EVENTUALLY BE DEPLETED; THAT THE HYDROCARBONS WE WERE BURNING FOR ENERGY WOULD BE DESPERATELY NEEDED BY FUTURE GENERATIONS AS RAW MATERIALS. BACK IN 1936, I HAD COMPUTED THAT THE OIL USED IN ALL HISTORY WAS ONE CUBIC MILE IN VOLUME. BY 1979, THE TOTAL OIL CONSUMPTION HAD REACHED 17 CUBIC MILES (463 BILLION BARRELS), A CUBE ABOUT 2.6 MILES ON A SIDE. THESE FIGURES SHOW HOW SMALL THIS PRECIOUS RESOURCE IS.

FOR TOO MANY YEARS EVERY NEW HIGHWAY OR INVENTION WAS WELCOMED AS AN INDICATOR OF PROGRESS WITHOUT TAKING INTO ACCOUNT THE LONG RANGE CONSEQUENCES. MANKIND HAS BEEN PROFLIGATE—AS IF WE WERE OWNERS RATHER THAN TRUSTEES OF THIS PLANET.

TODAY, THERE IS A GREATER AWARENESS OF THESE PROBLEMS, BUT NOT THE RECOGNITION OF THE LIMITS THAT NATURE IMPOSES. FROM MANY QUARTERS THERE ARE PRESSURES TO COME UP WITH A "SAFE" SOURCE OF ABUNDANT ENERGY. BUT EACH ALTERNATIVE HAS ITS LIMITATIONS. SOME, SUCH AS NUCLEAR POWER, ARE OPPOSED BY SINGLE INTEREST GROUPS THAT OFTEN VIE TO BE THE LOUDEST TO CRY DOOM. AS MORE ASPECTS OF EVERYDAY LIFE ARE BEING CHARACTERIZED BY ONE GROUP OR ANOTHER, AS INVOLVING HIGH RISK, ORDINARY CITIZENS ARE FINDING IT INCREASINGLY DIFFICULT—PERHAPS IMPOSSIBLE—TO GET THE ISSUES INTO PERSPECTIVE.

WITHIN SOME SPECIAL INTEREST GROUPS ARE THOSE WHO FAVOR RETURNING TO THE SIMPLER STYLE OF 100 YEARS AGO. THEIR OBJECTIVE IS CLEAR; THEY TEND TO BE AGAINST MOST FORMS OF ENERGY.

THE GREAT MAJORITY OF PEOPLE, HOWEVER, WANT TO SUSTAIN TODAY'S ADVANCED LIFE STYLE. FOR THEM THE PROBLEM IS ONE OF EVALUATIING ALTERNATIVES—OF COMPARING RISKS AND WEIGHING THEM AGAINST BENEFITS.

THE MEDIA, IN SEARCH OF EXCITING NEWS, AND SPECIAL INTEREST GROUPS, ENCOURAGE EMBELLISHING AND SENSATIONALIZING FACTS. SINCE TOUGH FACTS ARE OFTEN BLAND AND HARD TO MARKET AS "NEWS," THE PUBLIC GETS A DISTORTED PICTURE OF ENVIRONMENTAL MATTERS. WE FACE A DANGER THAT PUBLIC POLICIES IN TECHNOLOGY WILL BE DETERMINED, IN EFFECT, BY THE MEDIA AND BY SINGLE INTEREST GROUPS.

WHILE THE PROBLEMS WE FACE TODAY ARE IMMENSE, THE INCREASED PUBLIC INTEREST IN ENERGY AND ENVIRONMENTAL MATTERS OFFERS AN OPPORTUNITY FOR PROGRESS TOWARD SOLVING THESE DIFFICULT, LONG RANGE PROBLEMS. BUT THESE WILL HAVE TO BE DEALT WITH INTELLIGENTLY, NOT ON AN EMOTIONAL BASIS. SCIENTISTS, ENGINEERS, BUSINESSMEN, MEDICAL PEOPLE, LAWYERS, AND OTHERS WITH PROFESSIONAL KNOWLEDGE AND TRAINING ARE BEING CALLED UPON FOR FACTS AND ADVICE. IT IS ESSENTIAL THAT ALL INVOLVED TAKE TO HEART THEIR PROFESSIONAL RESPONSIBILITIES; THAT THEY FEEL DUTY BOUND TO CONVEY WHAT THEY KNOW AND WHAT THEY DO NOT KNOW, WITH BALANCE AND PERSPECTIVE. THAT

IS NOT THE CASE IN MANY AREAS OF SOCIETY AND IS WHY, AS THE PRESIDENT RECENTLY SAID, AMERICA IS SUFFERING A CRISIS OF CONFIDENCE. THE AMERICAN PEOPLE SIMPLY DO NOT KNOW WHAT OR WHOM TO BELIEVE.

OUR SOCIETY NOW ABOUNDS WITH SO-CALLED EXPERTS WHO DEAL IN HALF-TRUTHS AND PLAY ON HUMAN FEARS OR SUSPICIONS TO FURTHER THEIR OWN SPECIAL INTERESTS. AND A HALF-TRUTH IS LIKE A HALF-BRICK—IT WILL GO FARTHER. IN SO DOING, THEY ABROGATE THEIR PROFESSIONAL RESPONSIBILITY TO THE PUBLIC AND CLOUD IMPORTANT ISSUES. THOSE KNOWLEDGEABLE IN THE VARIOUS DISCIPLINES HAVE AN OBLIGATION TO SEE THAT THESE ISSUES ARE KEPT IN PERSPECTIVE, SO THEY CAN BE ADDRESSED INTELLIGENTLY BY OUR LEADERS AND UNDERSTOOD BY ORDINARY CITIZENS. CONSISTENCY IS NEEDED IN EVALUATING RISKS, AND IN PROVIDING PROPER PERSPECTIVE.

ENVIRONMENTAL RISKS

NOTHING WE DO IS WITHOUT RISK. RISK IS AN INHERENT AND ACCEPTED PART OF DAILY LIFE. THE PROBLEM LIES IN DETERMINING HOW GREAT ARE THE RISKS AND WHAT SHOULD WE TRULY BE AFRAID OF. FOR THIS, IT IS IMPORTANT TO ACQUIRE A SENSE OF PERSPECTIVE. SHOULD THE FALLING OF SKYLAB HAVE BEEN A MAJOR CONCERN? IT WAS ESTIMATED THAT THERE WAS ONLY ONE CHANCE IN 150 THAT SKYLAB DEBRIS WOULD HIT ONE PERSON IN THE ENTIRE WORLD. NEVERTHELESS, IN SOME AREAS EMERGENCY PREPAREDNESS CENTERS WERE ACTIVATED AND AIRPLANES GROUNDED. A MORE MEANINGFUL RISK TO ME WAS THAT I HAD ONE CHANCE IN SIX HUNDRED BILLION OF BEING HIT. THIS RISK WAS WORTH WORRYING ABOUT FOR ABOUT ONE BILLIONTH OF MY TIME, WHICH TRANSLATES TO ABOUT ONE SECOND.

THE RISK FROM SKYLAB WAS INCONSEQUENTIAL. THE ENVIRONMENTAL RISK HAVING THE GREATEST EFFECT IN THE UNITED STATES TODAY IS SMOKING. SMOKING CAUSES US ABOUT 325,000 DEATHS EACH YEAR, HALF THESE ARE FROM HEART DISEASE, AND ABOUT ONE-QUARTER FROM LUNG CANCER. SIXTY YEARS AGO

WE HAD LITTLE LUNG CANCER. TODAY MORE ARE DYING FROM IT THAN FROM AUTOMOBILE ACCIDENTS.

EACH CIGARETTE HAS BEEN ESTIMATED TO SHORTEN LIFE EXPECTANCY BY FIVE MINUTES. ANOTHER METHOD OF ESTIMATING THE RISK SHOWS THAT OF A GROUP OF 10,000 WHO CONTINUE SMOKING, 1600 DIE FROM THE EFFECTS.

ANOTHER MAJOR HEALTH PROBLEM IN THE UNITED STATES IS CAUSED BY OVERWEIGHT. OUR AFFLUENCE AND USE OF TELEVISION CONTRIBUTE TO THIS. EACH OUNCE ABOVE NORMAL WEIGHT IS ESTIMATED TO REDUCE LIFE EXPECTANCY BY TWO DAYS.

WE ACCEPT THE INEVITABILITY OF AUTOMOBILE ACCIDENTS. CHANCES ARE THAT TEN PEOPLE IN THIS ROOM WILL BE SERIOUSLY INJURED THIS YEAR FROM AUTOMOBILES. BY BUILDING SAFER CARS OR FURTHER REDUCING SPEED THE RISK COULD BE REDUCED. BUT EVEN A PARKED CAR IS NOT RISK FREE. YOU COULD CHOOSE NOT TO DRIVE, YET PEDESTRIANS AND BICYCLISTS ALSO ARE INJURED BY CARS. REDUCING THE RISK OF INJURY FROM AUTOMOBILES TO ZERO REQUIRES MOVING TO A PLACE WHERE THERE ARE NONE.

THESE COMPARISONS SHOULD GIVE SOME IDEA OF THE RISK INVOLVED IN THINGS YOU ARE FAMILIAR WITH. THEY GIVE A BASIS FOR JUDGING WHAT SMOKING, OR EATING, OR WATCHING SKYLAB FALL, COULD MEAN TO YOUR HEALTH AND SAFETY. THIS IS THE KIND OF PERSPECTIVE TO WHICH PEOPLE CAN RELATE. EVERYONE KNOWS LIFE IS RISKY. IF HE HAS THE BASIS FOR JUDGEMENT, HE CAN DECIDE WHAT TO DO OR NOT DO.

RADIATION RISK

WHILE ACCEPTING THE MANY DAILY RISKS OF LIVING, MANY SEEM TO BE GETTING THE IDEA THAT THEIR DEMANDS FOR ENERGY SHOULD BE

MET ON ESSENTIALLY A RISK-FREE BASIS. SINCE THIS IS IMPOSSIBLE, ATTENTION SHOULD BE FOCUSED ON TAKING REASONABLE STEPS TO SAFEGUARD THE PUBLIC, ON DEVELOPING REALISTIC ASSESSMENT OF THE RISKS, AND ON PLACING THEM IN PERSPECTIVE. ONE OF THE MOST WIDELY DISTORTED RISKS IS RADIATION.

AT THE START OF THE NAVY'S NUCLEAR PROPULSION PROGRAM IN 1946, I REALIZED THE NEED FOR CAREFUL ATTENTION TO RADIATION. IT WAS CLEAR TO ME THAT IF NUCLEAR SHIPS WERE TO BE VIABLE, THERE WOULD HAVE TO BE ASSURANCE THAT WORKERS AND CREWS NOT BE SUBJECTED TO EXCESSIVE RADIATION. TO EMPHASIZE THIS, I DESIGNED THE SHIELDING FOR OUR NAVAL NUCLEAR PLANTS TO BE MANY TIMES MORE STRINGENT THAN REQUIRED BY THE STANDARDS THEN IN EFFECT. AS A RESULT, THE SHIELDING BUILT INTO THE FIRST NUCLEAR SUBMARINE, THE NAUTILUS, WAS SO CONSERVATIVE THAT IT CONTINUES TO BE FAR MORE THAN ADEQUATE TO MEET THE CONSIDERABLY LOWER RADIATION LEVELS PERMITTED TODAY.

MY APPROACH TO RADIATION SHIELDING DESIGN WAS NOT AGREED TO IN SOME PLACES. FOR EXAMPLE, IN 1957, THE CHIEF OF THE BUREAU OF SHIPS—MY BOSS—ASKED ME TO REDUCE THE SHIELDING IN OUR SUBMARINES IN ORDER TO SAVE WEIGHT. LIKEWISE, IN 1965, A CONGRESSIONAL COMMITTEE LAUNCHED AN INVESTIGATION TO DETERMINE WHETHER MY CONSERVATIVE APPROACH TO SHIELDING WAS UNNECESSARILY INCREASING THE COST OF SUBMARINES. IN BOTH CASES I HELD TO MY DETERMINATION TO KEEP RADIATION LEVELS AS LOW AS I COULD REASONABLY GET.

INSOFAR AS THE ENVIRONMENT IS CONCERNED NAVAL PLANTS HAVE BEEN SO DESIGNED AND OPERATED THAT IN EACH OF THE LAST EIGHT YEARS THE TOTAL GAMMA RADIOACTIVITY DISCHARGED TO ALL HARBORS OF THE WORLD HAS BEEN LESS THAN TWO THOUSANDTHS OF A CURIE. THIS QUANTITY IS FOR THE OPERATION OF OVER 100 SHIPS AND OF ALL THEIR SUPPORT FACILITIES. TO GIVE YOU AN IDEA WHAT THIS MEANS, IF ONE PERSON WERE ABLE TO DRINK THE ENTIRE AMOUNT OF THIS

RADIOACTIVITY DISCHARGED INTO ANY HARBOR IN ALL OF 1978, HE WOULD NOT EXCEED THE ANNUAL RADIATION EXPOSURE PERMITTED BY THE NUCLEAR REGULATORY COMMISSION FOR AN INDIVIDUAL WORKER.

THE WORD "RADIATION" HAS COME TO CONNOTE DANGER. IT IS OFTEN DESCRIBED AS SO DANGEROUS THAT ANY AMOUNT IS UNSAFE—AS IF THE ONLY QUESTION WORTH ADDRESSING IS "HOW FAST WILL RADIATION HARM YOU?" BECAUSE YOU CANNOT SEE, FEEL, TASTE, HEAR, OR SMELL RADIATION, IT HAS AN AURA OF MYSTERY. BUT THIS SAME MYSTERY APPEARS TO BE ABSENT FROM OTHER POTENTIALLY HAZARDOUS THINGS FOR WHICH WE HAVE A LACK OF SENSORY PERCEPTION, SUCH AS RADIO WAVES, CARBON MONOXIDE, AND SMALL CONCENTRATIONS OF NUMEROUS CANCER-CAUSING SUBSTANCES. THESE DO NOT GENERATE THE SAME DEGREE OF FEAR AS RADIATION.

THE FEAR INSTILLED BY RADIOACTIVITY TODAY IS AKIN TO THE FEAR OF ELECTRICITY FOLLOWING THE INVENTION OF THE ELECTRIC LIGHT BULB ONE HUNDRED YEARS AGO BY THOMAS EDISON. PUBLIC FEAR OF ELECTRICITY WAS INFLAMED. WALL PLAQUES HAD TO BE INSTALLED IN ROOMS WITH ELECTRIC LIGHTS, ASSURING PEOPLE THAT "THE USE OF ELECTRICITY FOR LIGHTING IS IN NO WAY HARMFUL TO HEALTH, NOR DOES IT AFFECT THE SOUNDNESS OF SLEEP." YET ELECTRICITY HAS HELPED TO TRANSFORM MAN'S LIFE FROM A SHORT ONE OF DRUDGERY TO ONE WHERE LONG LIFE AND HIGHER ASPIRATION CAN BE REALIZED.

SCIENTISTS HAVE STATED FOR DECADES THAT RADIATION CAN CAUSE HARM. HOWEVER, ALL OF US HAVE BEEN SUBJECTED TO RADIATION THROUGHOUT OUR LIVES FROM TIME OF CONCEPTION AND, IN FACT, EVEN PRIOR TO CONCEPTION. THE ENTIRE HUMAN RACE HAS BEEN SUBJECTED TO RADIATION, AS HAS EVERY LIVING THING, THROUGHOUT THE ENTIRE EVOLUTION OF OUR EARTH. THE AVERAGE PERSON IN THE UNITED STATES RECEIVES EACH YEAR ABOUT ONE-TENTH REM FROM NATURAL RADIOACTIVITY IN THE EARTH, IN HIS BODY, AND FROM COSMIC RADIATION.

THE UNIT OF RADIATION, REM, OUGHT TO BE REQUIRED KNOWLEDGE IN ALL TECHNICAL SOCIETIES. IT IS DEFINED IN TERMS OF ENERGY ABSORBED IN BODY TISSUES. RECEIVING ONE REM OF GAMMA RADIATION IS EQUIVALENT TO ABSORBING 100 ERGS OF RADIATION ENERGY FOR EACH GRAM OF BODY TISSUE. THERE ARE 454 GRAMS IN A POUND. AN ERG IS THE AMOUNT OF ENERGY REQUIRED TO LIFT A MOSQUITO WEIGHING ONE THOUSANDTH OF A GRAM ABOUT ONE CENTIMETER. IN TERMS OF ENERGY THE REM IS A SMALL UNIT. A DOSE OF ONE REM WOULD RAISE BODY TEMPERATURE ONLY TWO MILLIONTHS OF A DEGREE CENTIGRADE.

WE ARE NOT ACCUSTOMED TO FEAR BACKGROUND RADIATION; AFTER ALL IT IS PART OF OUR NATURAL ENVIRONMENT. YET IN SCIENTIFIC TERMS IT CAN BE SHOWN THAT ITS RISK IS NOT ZERO. MORE IS KNOWN ABOUT RADIATION THAN ALMOST ANY SUBSTANCE THAT CAN AFFECT HUMANS. MORE MONEY HAS BEEN SPENT TO LEARN THE EFFECTS OF RADIATION ON HUMANS THAN FOR ANY OTHER HAZARD IN OUR MODERN SOCIETY. THE MAIN EFFECT IS CANCER. EFFECTS OTHER THAN CANCER HAVE NOT BEEN FOUND FOR LOW-LEVEL RADIATION EXPOSURE TO ADULTS. WHILE GENETIC EFFECTS FROM RADIATION CAN OCCUR, THEY ARE SO SMALL THAT NONE HAVE BEEN FOUND IN 35,000 CHILDREN CONCEIVED AFTER THE NUCLEAR EXPLOSIONS, BY PARENTS IRRADIATED IN HIROSHIMA OR NAGASAKI IN 1945.

THE COMBINATION OF ONE-TENTH REM PER YEAR BACKGROUND RADIATION, TOGETHER WITH NEARLY THE SAME AVERAGE AMOUNT FROM MEDICAL DIAGNOSTIC RADIATION, IS ESTIMATED TO CAUSE ALMOST ONE PERCENT OF CANCER DEATHS IN THE UNITED STATES. IN AN AVERAGE GROUP OF 10,000 PEOPLE, 1600 WILL DIE OF CANCER. SIXTEEN OF THESE DEATHS WILL BE FROM BACKGROUND AND MEDICAL RADIATION. IF THE LIFETIME RADIATION EXPOSURE OF 10,000 PEOPLE IS

INCREASED BY AN AVERAGE OF ONE REM PER PERSON—A TOTAL OF 10,000 REM—IT IS ESTIMATED THAT ONE ADDITIONAL FATAL CANCER MAY OCCUR.*

THIS ESTIMATE OF RISK GIVES PERSPECTIVE ON WHAT RADIATION EXPOSURE MEANS IN THE FOLLOWING WAYS:

- OF ALL INDUSTRIAL AND MEDICAL RADIATION WORKERS IN THE UNITED STATES, ABOUT 15,000 DIE EACH YEAR FROM CANCER. THE TOTAL RADIATION EXPOSURE FROM THEIR WORK ADDS AN ESTIMATED 25 CANCER DEATHS PER YEAR.
- RADIATION FROM THE NUCLEAR ACCIDENT AT THREE MILE ISLAND MAY ADD ONE FATAL CANCER DEATH TO THE PUBLIC WITHIN FIFTY MILES. OF THE TWO MILLION PEOPLE LIVING WITHIN THIS FIFTY MILE RADIUS, 325,000 ARE EXPECTED TO DIE OF CANCER FROM CAUSES OTHER THAN THE RADIOACTIVITY RELEASED FROM THIS ACCIDENT.

THE PERSPECTIVE ON RADIATION CAN BE IMPROVED BY COMPARISON. FOR EXAMPLE, I KNOW AN APPARENTLY HEALTHY PERSON WHO FORTY YEARS AGO RECEIVED MORE RADIATION FROM MEDICAL CHEST X-RAYS THAN THE TOTAL EXPOSURE ALL 15,000 RADIATION WORKERS AT NINE SHIPYARDS RECEIVED IN 1978 FROM NAVAL NUCLEAR POWER PLANT WORK. OTHERS HAVE HAD SIMILAR RADIATION EXPOSURE, AND YEARS LATER ARE ALIVE AND WELL.

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*This risk estimate was made in 1977 by the United Nations Scientific Committee on the Effects of Atomic Radiation and by the International Commission on Radiological Protection. It is within the range of estimates in the 1979 draft report of the U. S. National Academy of Sciences Committee on Biological Effects of Ionizing Radiations, and in the 1972 report of this committee.

ANOTHER EXAMPLE: FOR YEARS RUMORS HAVE PERSISTED THAT RADIATION-INDUCED CANCER HAS KILLED THE CREW OF THE FIRST NUCLEAR-POWERED SHIP, THE NAUTILUS. IN 1978 THE NAVY TRACED EACH OF THE 96 OFFICERS AND ENLISTED MEN OF THIS FIRST CREW. DESPITE THE RUMORS, ALL THE MEN ASSOCIATED WITH OPERATING THE NUCLEAR PROPULSION PLANT WERE ALIVE AND WELL.

WITH THIS PERSPECTIVE YOU ARE IN A POSITION TO BETTER ANSWER THE QUESTION, "IS RADIATION SAFE?" IF SAFE MEANS ZERO EFFECT, THEN YOU HAVE TO CONCLUDE RADIATION IS UNSAFE. BUT TO BE CONSISTENT, YOU SHOULD ALSO CONCLUDE THAT BACKGROUND RADIATION AND MEDICAL RADIATION ARE UNSAFE. OR MORE SIMPLY, THAT BEING ALIVE IS UNSAFE.

"SAFE" IS A RELATIVE TERM. COMPARISONS ARE NECESSARY FOR ACTUAL MEANING. FOR A WORKER, SAFE MEANS THE RISK IS SMALL COMPARED TO OTHER RISKS ACCEPTED IN NORMAL WORK ACTIVITIES. ASIDE FROM WORK, SAFE MEANS THE RISK IS SMALL COMPARED TO OTHER RISKS ROUTINELY ACCEPTED IN LIFE. FROM WHAT I HAVE SAID, IT SHOULD BE CLEAR THAT THE RADIATION ENCOUNTERED IN OUR DAILY ACTIVITIES SHOULD NOT BE THE SCARY SUBJECT IT IS PROCLAIMED TO BE.

EXTRAPOLATIONS

IN RADIATION, AS IN OTHER AREAS, A MOST EFFECTIVE WAY TO FRIGHTEN PEOPLE IS TO PROCLAIM THAT NO ONE KNOWS WHAT THE EFFECTS ARE. THIS HAS BEEN REPEATED SO OFTEN THAT IT HAS BECOME AN ARTICLE OF FAITH THAT NO ONE KNOWS THE EFFECTS OF LOW-LEVEL RADIATION ON HUMANS.

ONE COULD WELL STATE, "NO ONE KNOWS THE RISKS OF SMOKING A FEW CIGARETTES," BUT THE RISKS OF SMOKING A LARGE NUMBER OF CIGARETTES ARE WELL KNOWN. IF 10,000 PEOPLE SMOKE AN AVERAGE OF FOUR CIGARETTES A DAY, ABOUT 100 DEATHS WILL RESULT; DATA ARE NOT AVAILABLE FOR LOWER SMOKING RATES. FOR RADIATION, DOSES OF 100 REM TO EACH OF 10,000 PEOPLE WOULD BE REQUIRED TO CAUSE AN EQUAL NUMBER OF DEATHS. THE EFFECTS OF RADIATION ON HUMANS AT DOSES OF 100 REM ARE WELL KNOWN. THE MAJOR CONTROVERSY OVER RADIATION RISKS TODAY IS HOW TO EXTEND THE RISK ESTIMATES TO EVEN LOWER LEVELS. AS WE GET TO LOWER LEVELS, IT BECOMES MORE AND MORE DIFFICULT TO DETECT THE EFFECTS, AND THIS BECOMES A PROBLEM. WOULD IT BE POSSIBLE TO DETERMINE THE EFFECT ON THE DEATH RATE OF DOING ONE SITUP OR ONE PUSHUP A DAY?

USING THE FIGURES I JUST PRESENTED YOU CAN EXTEND THE NUMBERS TO SHOW THAT ONE REM HAS ABOUT THE SAME RISK OF DEATH AS SMOKING ONE CIGARETTE PER MONTH. I MAKE THIS COMPARISON ONLY TO SHOW THAT FINDING OUT THE EFFECT ON THE DEATH RATE OF ONE REM OF EXPOSURE IS ABOUT THE SAME AS TRYING TO FIND OUT THE EFFECT OF SMOKING ONE CIGARETTE A MONTH.

THE POINT IS THAT THE EFFECT OF ONE REM IS EXTREMELY SMALL. THERE ARE PHYSICAL LIMITS TO HOW FAR WE CAN GO TO ASCERTAIN PRECISELY THE SIZE OF THIS RISK, BUT WE DO KNOW IT IS SMALL. THOSE WHO SING THE REFRAIN OF HOW LITTLE WE KNOW ABOUT LOW-LEVEL RADIATION DO A DISSERVICE. INSTEAD, THEY SHOULD EXPLAIN HOW MUCH WE DO KNOW ABOUT THE SMALL ACTUAL EFFECTS.

STUDIES

TODAY, THE UNIVERSAL ANSWER TO A CLAIMED LACK OF KNOWLEDGE OF ENVIRONMENTAL EFFECTS IS TO CONDUCT A STUDY—NEARLY ALWAYS AT GOVERNMENT EXPENSE. I AM NOT AGAINST STUDYING ENVIRONMENTAL OR HEALTH EFFECTS PER SE. BUT STUDIES MUST BE HIGH QUALITY; THEY HAVE TO COVER TENS OR HUNDREDS OF THOUSANDS OF PEOPLE, AND THEY MUST EXTEND FOR MANY YEARS.

TO HAVE ANY CHANCE OF VALIDLY DETECTING EFFECTS AS SMALL AS THOSE FROM LOW-LEVEL RADIATION. ONE WONDERS WHETHER THIS IS A PROPER EXPENDITURE OF TAXPAYER MONEY. ARE THERE NOT OTHER AREAS MORE DESERVING OF THIS KIND OF ATTENTION?

THE COMPULSION TO STUDY IS OFTEN USED TO QUELL PUBLIC FEARS. IT IS ALSO A WAY TO SHOW THAT SOMETHING IS BEING DONE. AT THREE MILE ISLAND, EPIDEMIOLOGICAL STUDIES ARE BEING LAUNCHED. ONE STUDY HAS BEEN COMMISSIONED TO INVESTIGATE THE RADIATION EFFECTS ON ALL PREGNANT WOMEN IN THE AREA—THERE WERE ONLY A FEW HUNDRED. THESE PREGNANT WOMEN RECEIVED LESS EXTRA EXPOSURE TO RADIATION AS A RESULT OF THE THREE MILE ISLAND ACCIDENT THAN THEY WOULD HAVE RECEIVED HAD THEY MOVED TO DENVER, COLORADO FOR A FEW MONTHS. IF WE MUST HAVE A NEW STUDY, IT WOULD MAKE MORE SENSE TO STUDY RADIATION EFFECTS IN DENVER, WITH ITS HIGHER BACKGROUND RADIATION DUE TO THE HIGH ALTITUDE. OR MEMBERS AND STAFFS OF THE U. S. CONGRESS COULD BE STUDIED BECAUSE THERE ARE PLACES ON CAPITOL HILL WITH RADIATION LEVELS ABOVE NORMAL BACKGROUND DUE TO NATURAL ELEMENTS IN THE BUILDING STONE. IF THE IDEA OF CONDUCTING STUDIES ON CONGRESSIONAL GROUPS STRIKES YOU AS STRANGE, YOU MAY UNDERSTAND WHY I HAVE RESERVATIONS ABOUT THE REAL NEED FOR SOME OF THE STUDIES UNDERWAY.

A STUDY IS OFTEN THE WAY TO FORESTALL TAKING MEANINGFUL ACTION OR MAKING A DECISION. DOING A STUDY IS USUALLY DOING NOTHING. DEMONTAIGNE SAID "TOO MUCH STUDY SUFFOCATES THE ACTIVE PART OF UNDERSTANDING." STUDIES ARE FREQUENTLY USED TO QUIET AN OUTCRY. THE STUDY TAKES TIME. DURING THIS PERIOD THE CLAMOR DIES DOWN. THE STUDY IS ISSUED, FILED AND FORGOTTEN. MEANWHILE A NEW ISSUE HAS AROUSED THE PUBLIC. ANOTHER STUDY IS AUTHORIZED. THE REPORT IS FILED IN THE ARCHIVES, AND SO ON, AND SO ON.

INJURY CLAIMS

ANOTHER ASPECT OF RADIATION WHERE SCARE STORIES ARE CONTRIBUTING TO THE PROBLEM IS IN THE REALM OF RADIATION INJURY CLAIMS. HERE, AS IN OTHER AREAS, OUR APPROACH TO LIFE IS TO TURN FROM SELF-SUFFICIENCY TO EXCESSIVE RELIANCE ON GOVERNMENT. MANY HAVE COME TO PRESUME THAT ANY RISK, NO MATTER HOW SMALL, WARRANTS INDEMNIFICATION BY THE GOVERNMENT. I AM NOT AGAINST THE PAYMENT OF LEGITIMATE CLAIMS WHERE THE CAUSE CAN BE SUBSTANTIATED AND IT CAN BE CLEARLY SHOWN THAT THE GOVERNMENT WAS AT FAULT. BUT WHEN THE RISKS ARE MINIMAL, COMMON SENSE SHOULD PREVAIL.

IN 1978, A WORKER IN NEW MEXICO WAS AWARDED $75,000 IN WORKER'S COMPENSATION BECAUSE HE FEARED RADIATION. NO PHYSICAL INJURY WAS CLAIMED. NO EXCESSIVE EXPOSURE TO RADIATION WAS CLAIMED. IN 1979, THE CONNECTICUT STATE SUPREME COURT AWARDED COMPENSATION TO A MUNICIPAL EMPLOYEE FOR INJURING HIS ANKLE PLAYING PING PONG BEFORE HIS WORK SHIFT STARTED. A COMPENSATION CLAIM WAS APPROVED FOR A NAVY WORKER FOR HEADACHES ALLEGEDLY CAUSED BY SITTING AT A DESK WITH HIS HEAD DOWN. SUCH ABUSES ARE BECOMING COMMON. THE IMPLICATIONS OF THESE AWARDS ARE FAR-REACHING— NOT SIMPLY FOR THE MONEY INVOLVED BUT IN THE ATTITUDES BEING INCULCATED INTO LARGE NUMBERS OF AMERICANS.

THERE ARE ABOUT 65,000 EMPLOYEES IN GOVERNMENT-OWNED NAVAL SHIPYARDS. ABOUT 22,000 PAST AND PRESENT EMPLOYEES HAVE FILED CLAIMS FOR DAMAGE TO THEIR EARS FROM NOISE. THESE GOVERNMENT WORKERS ARE BEING PAID AN AVERAGE OF $12,000 PER CLAIM. NO DISTINCTION IS MADE FOR NORMAL LOSS OF HEARING WITH AGE. NO EFFORT IS MADE TO DIFFERENTIATE HEARING DAMAGE CAUSED ON THE JOB FROM THAT CAUSED BY MODERN MUSIC PLAYED AT DEAFENING VOLUME.

SECRETARIES WHOSE ONLY EXPOSURE TO NOISE WAS A TYPEWRITER OR COPY MACHINE ARE RECEIVING AWARDS. WORKERS APPARENTLY FEEL IT IS THEIR RIGHT TO RECEIVE THESE AWARDS FOR NORMAL WORK. IN THE LAST TEN YEARS, OVER $75,000,000 HAS BEEN AWARDED TO NAVAL SHIPYARD EMPLOYEES FOR ALLEGED HEARING LOSS. THE GENERAL ACCOUNTING OFFICE HAS STUDIED THIS AREA AND FOUND IT RIDDLED WITH FRAUD AND ABUSE.

SINCE RISK FROM RADIATION CANNOT BE PROVEN TO BE ZERO, SUGGESTIONS HAVE BEEN MADE THAT THE GOVERNMENT SHOULD PAY ALL SHIPYARD WORKERS WHO GET CANCER JUST TO BE SURE THAT NONE WHICH MIGHT BE RELATED TO RADIATION ARE MISSED. AT A TYPICAL SHIPYARD, ABOUT 10,000 WORKERS HAVE RECEIVED RADIATION EXPOSURE FROM NAVAL NUCLEAR PROPULSION WORK SINCE THE BEGINNING OF THE PROGRAM. THEIR RADIATION EXPOSURE FROM SUCH WORK MAY ADD ONE OR TWO CANCER DEATHS TO THE 1600 NORMALLY EXPECTED IN A GROUP THIS SIZE. TO PAY COMPENSATION TO 1600 INDIVIDUALS SO THAT ONE OR TWO POSSIBLY DESERVING ONES ARE NOT DENIED IS ABSURD AND UNAFFORDABLE.

DEMANDS HAVE BEEN MADE THAT ALL VETERANS WHO DEVELOP CANCER BE COMPENSATED BECAUSE THE CANCER MIGHT HAVE BEEN CAUSED BY RADIATION FROM NUCLEAR WEAPONS TESTS. THIS WOULD RESULT IN THE GOVERNMENT MAKING PAYMENT TO ALMOST 100,000 MEN WHO, ACCORDING TO NORMAL INCIDENCE, WILL DIE OF CANCER, SO THAT AN ESTIMATED TWELVE POSSIBLY VALID CLAIMS ARE NOT MISSED. MANY CLAIMS HAVE ALREADY BEEN FILED BY THESE VETERANS.

THE NAVY'S EXPERIENCE WITH HEARING LOSS CLAIMS DEMONSTRATES THAT AS LONG AS THERE IS MONEY IN THE U. S. TREASURY AND GOVERNMENT AGENCIES ARE WILLING TO HAND IT OUT, THERE WILL BE PLENTY OF CLAIMANTS. MANY ARE URGED ON BY UNSCRUPULOUS LAWYERS WHO PROMOTE FRIVOLOUS CLAIMS FOR A FEE OR A PERCENTAGE OF THE AWARD. ORDINARY CITIZENS, IF THEY KNEW WHAT

WAS GOING ON IN SOME OF THESE PROGRAMS WOULD DEMAND A HALT TO SUCH GENEROSITY WITH THEIR TAXES.

TO THOSE WHO GET PAID, THIS KIND OF CANCER PAYMENT PROGRAM MAY SEEM LIKE GETTING SOMETHING FOR NOTHING—LIKE CHAIN LETTERS, THE PYRAMID CLUB, OR THE CIRCLE OF GOLD CONFIDENCE GAMES. BUT THE TAXPAYER FOOTS THE BILL. IN MY VIEW, ENVIRONMENTAL ISSUES ARE BADLY OUT OF PERSPECTIVE WHEN WE END UP WITH A SYSTEM THAT PAYS TAX MONEY TO ALL WHO GET CANCER, MERELY TO TAKE CARE OF A FEW FOR WHOM THE REAL CAUSE WAS RADIATION.

NEWS MEDIA

THE NEWS MEDIA HAVE CONTRIBUTED SUBSTANTIALLY TO GETTING ENVIRONMENTAL ISSUES OUT OF PERSPECTIVE. IN THEIR EFFORTS TO GENERATE INTERESTING STORIES THAT HELP SELL NEWSPAPERS, MANY MEMBERS OF THE PRESS HAVE DISTORTED THE FACTS AND THE ISSUES. IN COMPLEX AREAS LIKE ENERGY AND ENVIRONMENT, BARE FACTS ARE UNEXCITING. TO SPICE UP OTHERWISE DULL ARTICLES, THERE IS AT TIMES A TENDENCY TO BE SELECTIVE IN THE FACTS USED OR IN THE TOPICS COVERED. AT TIMES CONCLUSIONS ARE SHOWN AS FACTS. I UNDERSTAND THAT IN SOME PUBLICATIONS, THE ADVERTISING DEPARTMENT HAS A SAY IN WHAT GETS PRINTED AS NEWS.

TOO OFTEN, FACTS HAVE LOST THEIR PROPER SEPARATION FROM OPINIONS. MERELY BY CHOOSING WHAT STORIES ARE REPORTED, THE MEDIA EXPRESS OPINIONS. PUBLISHING A STATEMENT WITHOUT RESERVATIONS LENDS AUTHORITY TO THAT STATEMENT. SERIOUS ARTICLES ARE OFTEN WRITTEN BY THOSE WHO LACK THE TECHNICAL BACKGROUND TO UNDERSTAND EVEN THE AVAILABLE FACTS. AND SOMETIMES NEWS IS CONTRIVED. LET ME GIVE YOU EXAMPLES:

- DURING THE THREE MILE ISLAND EMERGENCY, RESIDENTS AND LOCAL OFFICIALS COMMENTED HOW USEFUL THE LOCAL NEWS REPORTS WERE, BUT THAT THE NATIONAL NEWS REPORTS WERE DISTORTED. FOR EXAMPLE, ONE NATIONAL TELEVISION CREW REQUESTED THAT AN ENTIRE STREET BE CLEARED SO THAT THEIR FILM COULD SHOW, BY THE EMPTY STREET, HOW FRIGHTENED THE PEOPLE WERE.
- A SO-CALLED DOCUMENTARY TELEVISION REPORT ON RADIATION WAS STRONGLY ANTI-NUCLEAR. IT LED TO A CONCLUSION IN WHICH THE REPORTER WAS SAID TO HAVE BEEN KILLED BY RADIATION. HOWEVER, NOWHERE IN THE REPORT OF HIS DEATH FROM LUNG CANCER WAS IT MENTIONED THAT HE WAS A LONG-TERM HEAVY SMOKER.

IN AREAS SUCH AS NUCLEAR POWER, EVEN INNOCUOUS EVENTS ARE FREQUENTLY BLOWN INTO ISSUES BY A ZEALOUS REPORTER OR EDITOR. NOT LONG AGO, A HOSE BROKE, SPILLING A FEW GALLONS OF PURE WATER INTO ONE OF OUR MOST POLLUTED RIVERS. BECAUSE THIS HAPPENED ON A NUCLEAR-POWERED SUBMARINE, THE STORY APPEARED THE NEXT MORNING IN THE NEWSPAPER.

THE FAILURES OF THE MEDIA—ITS PREOCCUPATION WITH THE SENSATIONAL AND ITS LACK OF BALANCE AND PERSPECTIVE—ARE UNDERSTANDABLE TO SOME EXTENT. NEWS IS LIKE FISH—IT MUST BE SOLD QUICKLY. BUT THESE STORIES CAN HAVE A HARMFUL EFFECT ON THE PUBLIC. DOCTORS REPORT THAT FOLLOWING A SERIES OF NEWS STORIES WHICH FAN THE FEAR OF RADIATION, THE RISK OF DEATH INCREASES FOR PEOPLE WHO WILL NOT TAKE X-RAYS THEY SHOULD TAKE.

OUR COUNTRY'S GROWTH HAS BEEN FUELED BY TECHNOLOGY. THE BULK OF THE INFORMATION ON THIS SUBJECT IS IN THE NEWS MEDIA. IT, THEREFORE, HAS A SPECIAL OBLIGATION TO EDUCATE, THROUGH RESPONSIBLE REPORTING. GIVEN THE FACTS IN PROPER PERSPECTIVE, THE PUBLIC CAN UNDERSTAND ENVIRONMENTAL ISSUES. THE TENDENCY OF THE PRESS TO OMIT FACTS INTERFERES WITH

UNDERSTANDING THESE ISSUES. FOR PROPER PERSPECTIVE, THE NEWS MEDIA MUST EXERCISE SELF RESTRAINT, AND MAKE AVAILABLE ENOUGH INFORMATION SO THE PUBLIC CAN UNDERSTAND THE SIGNIFICANCE OF THE EVENTS REPORTED.

I HAVE NO SIMPLE SOLUTION FOR THIS PROBLEM. THE MEDIA ARE NOT REALLY ACCOUNTABLE TO ANYONE. FREEDOM OF THE PRESS BELONGS TO THE PERSON WHO OWNS THE PRESS. THE ONLY WAY I CAN SEE A CHANGE IS FOR THE PUBLIC TO DEMAND MORE ENLIGHTENED AND FACTUAL REPORTING; PERHAPS THE MEDIA WILL RESPOND. LOSS OF SALES OR VIEWER INTEREST IS SOMETHING A NEWSPAPER OR TV NETWORK UNDERSTANDS IMMEDIATELY.

GOVERNMENT

IN ENVIRONMENTAL MATTERS, THERE IS A TENDENCY TO VIEW GOVERNMENT OFFICIALS AS IF WORKING FOR THE GOVERNMENT WERE IN ITSELF EVIDENCE OF INCOMPETENCE AND BAD INTENTIONS, THEREFORE GUILTY OF THE CHARGES LEVELED AT THEM.

SOME SELF-PROCLAIMED PUBLIC INTEREST GROUPS TEND TO FOCUS ON A SINGLE ISSUE, DEMANDING AN IMMEDIATE SOLUTION REGARDLESS OF COST. BUT WHEN GOVERNMENT AGENCIES ARE PRESSURED INTO SOLVING ONE PROBLEM IN A NARROW FASHION, THIS OFTEN LEADS TO EXACERBATION OF OTHER PROBLEMS. IN SOME CASES COMPANIES HAVE BEEN FORCED TO SWITCH FROM COAL TO GAS FOR ENVIRONMENTAL REASONS ONLY TO HAVE TO SWITCH BACK A FEW YEARS LATER BECAUSE OF ENERGY CONSIDERATIONS.

THE GOVERNMENT AGENCIES INVOLVED IN THESE ISSUES HAVE AN ALMOST IMPOSSIBLE JOB. FACED WITH PROBLEMS THAT WOULD CHALLENGE THE WISDOM OF SOLOMON, GOVERNMENT AGENCIES ARE INCREASINGLY PLAGUED WITH OTHER DEMANDS ON THEIR LIMITED RESOURCES. THE FLOOD OF INJURY CLAIMS IS BUT A SMALL PART OF THE PROBLEM. TODAY WE IN GOVERNMENT CAN BE TIED IN

KNOTS BY FRIVOLOUS LAW SUITS, FREEDOM OF INFORMATION ACT REQUESTS, INVESTIGATIONS, AND STUDIES. THESE DEMANDS, INDIVIDUALLY, SEEM REASONABLE AND NECESSARY SAFEGUARDS OVER THE ACTIVITIES OF GOVERNMENT OFFICIALS. BUT FACED WITH LIMITED RESOURCES, THE CUMULATIVE EFFECT OF THESE DEMANDS DIVERTS ATTENTION AND EFFORT FROM THEIR PRIMARY FUNCTIONS. IT IS ANALOGOUS TO THE CASE OF CYRANO DE BERGERAC WHO HAD TO COMPOSE A SONNET WHILE FIGHTING A DUEL.

TO BE SURE, WE DO HAVE PROBLEMS IN GOVERNMENT. SOME GOVERNMENT AGENCIES THEMSELVES HAVE BECOME A SORT OF SPECIAL-INTEREST GROUP. IN THIS WAY THE GOVERNMENT ITSELF HAS BEEN UNABLE TO PROVIDE THE PERSPECTIVE TO BALANCE THE PROBLEMS INHERENT IN NEW TECHNOLOGIES. THOSE WHO CRITICIZE GOVERNMENT'S INABILITY TO RESPOND EFFECTIVELY TO THE CHALLENGES IT CONFRONTS, SHOULD WORK EQUALLY HARD TO PROMOTE WITHIN THE GOVERNMENT AN ATMOSPHERE IN WHICH IT IS POSSIBLE FOR US TO DEVOTE OUR ATTENTION TO IMPORTANT ISSUES.

"EXPERTS" IN SCARE STORIES

MANY HAVE COME TO REALIZE THEY CAN MAKE NAMES FOR THEMSELVES BY SCARING THE PUBLIC ON RADIATION AND OTHER ENVIRONMENTAL RISKS. THIS APPROACH CREATES REPUTATIONS BECAUSE THE NEWS MEDIA PLAY THEM UP. IT CREATES RESEARCH GRANTS—WITH THE GOVERNMENT, OF COURSE, PAYING—TO EXPLORE THE NEWLY DISCOVERED PROBLEMS. TIME AND AGAIN A SO-CALLED "EXPERT" MAKES A STARTLING "DISCOVERY" FOLLOWED BY A NOT-SO-STARTLING CONCLUSION THAT HE IS THE ONE WHO SHOULD CONDUCT FURTHER RESEARCH AT GOVERNMENT EXPENSE.

To illustrate the trouble one self-proclaimed expert can cause, I will recount a situation I have followed closely. Two years ago a young medical doctor with little if any experience in radiation or epidemiology research started investigating the effects of radiation on workers at the Portsmouth, New Hampshire Naval Shipyard. Studies in this field are complex, and require considerable talent and effort to find answers and avoid mistakes. In conducting the study he enlisted the help of an investigative reporting team from the Boston Globe.

In February 1978 the front page of this paper carried results of the investigation. This was not the case of a newspaper reporting something out of a technical journal; it was a report by the paper itself. No technical reviews were printed with this story. Reservations were stated in the story, but in a manner that made the reservations appear doubtful or readily dismissed. In the name of investigative reporting the newspaper itself had become an advocate for a highly questionable study, thereby dropping any vestige of objectivity. This was a classic case of limited information being blown into sensational news.

The story was printed in many newspapers here and abroad. The summary featured in many papers was that cancer deaths were six times higher for radiation workers at Portsmouth than for other workers. The news accounts spread fear among the workers, their families, and neighbors. Others here and abroad wondered if being near a nuclear-powered ship was dangerous.

The articles and concerns of constituents generated immediate Congressional interest. Within a week, a Congressional hearing took

PLACE. BUT LITTLE WAS DONE AT THIS HEARING TO EXPLORE THE VALIDITY OF THE STUDY'S CONCLUSIONS.

WHITE HOUSE OFFICIALS USED THE RESULTS OF THIS PRIVATE STUDY TO ORDER A GOVERNMENT-WIDE INVESTIGATION OF RADIATION. MILLIONS OF DOLLARS WILL BE SPENT CARRYING OUT THESE INVESTIGATIONS.

FOR THE PAST YEAR AND ONE-HALF I AND KEY PEOPLE IN MY ORGANIZATION AND AT THE SHIPYARDS HAVE BEEN TIED UP WITH THIS ISSUE. IT HAS CONSUMED OUR TIME AND INTERFERED WITH OUR PROPER WORK. IRONICALLY, IT HAS DIVERTED ATTENTION FROM AN IMPORTANT TECHNICAL ASPECT OF OUR JOB, WHICH IS TO ENSURE SAFETY OF WORKERS.

THROUGHOUT THE CONTROVERSY, THE NEWS MEDIA HEADLINE WRITERS FOUND IT DIFFICULT TO RESIST INSERTING THE WORD "DEADLY" IN FRONT OF "RADIATION." THEY RARELY REPORTED THE NAVY'S ACHIEVEMENTS IN RADIATION CONTROL, AND THE CAREFUL ATTENTION PAID IN THIS AREA. THOSE PROMOTING THE STORIES DID NOT BOTHER TO EXPLAIN THAT, DESPITE A DOUBLING IN THE NUMBER OF NUCLEAR-POWERED SHIPS, RADIATION EXPOSURE HAD BEEN REDUCED TO ONE QUARTER WHAT IT HAD BEEN FIFTEEN YEARS PREVIOUSLY; THAT NO ONE INVOLVED IN THE PROGRAM HAD EXCEEDED THE FEDERAL RADIATION EXPOSURE LIMITS IN A DOZEN YEARS; THAT NO ONE IN THE PROGRAM HAD RECEIVED MORE THAN ONE-TENTH THE RADIATION EXPOSURE ALLOWED FOR RADIOACTIVITY INSIDE THE BODY.

OFFICIAL RISK ESTIMATES INDICATE THAT ABOUT 1600 CANCER DEATHS ARE EXPECTED FOR EVERY 10,000 PEOPLE. AMONG THE 10,000 RADIATION WORKERS WHO HAVE WORKED AT THE PORTSMOUTH NAVAL SHIPYARD, EXPOSURE RECEIVED ON THE JOB MIGHT ADD TWO CANCER DEATHS. MANY SCIENTISTS BELIEVE THE TRUE

EFFECTS OF RADIATION WILL BE MUCH SMALLER.* THESE FACTS ARE IN SHARP CONTRAST TO THE EXAGGERATED STATEMENTS MADE IN THE BOSTON GLOBE.

EVENTUALLY THE FACTS BEGAN TO COME OUT. IN A CONGRESSIONAL HEARING ONE AND A HALF YEARS AFTER HIS REPORT WAS PUBLISHED, THE INVESTIGATING DOCTOR ENTIRELY CHANGED HIS RESULTS. HE REPUDIATED HIS EARLIER CONCLUSION THAT THE CANCER DEATH RATE FOR RADIATION WORKERS AT PORTSMOUTH WAS DOUBLE THE DEATH RATE OF THEIR CO-WORKERS. HE TESTIFIED HE COULD NO LONGER SUPPORT HIS EARLIER CONCLUSION THAT THE LEUKEMIA RATE WAS SIX TIMES HIGHER FOR PORTSMOUTH RADIATION WORKERS THAN FOR NON-RADIATION WORKERS.

I DO NOT INTEND TO DENIGRATE THOSE WHO ARE ADDRESSING VALID PUBLIC HEALTH ISSUES IN A RESPONSIBLE FASHION. BUT A TRUE PROFESSIONAL DOES NOT PUBLISH UNTIL HE KNOWS THE FACTS AND ACKNOWLEDGES THE SIGNIFICANCE OF POTENTIAL ERRORS. THOSE WHO DO NOT FOLLOW THIS PATH OF CREDIBLE SCIENTIFIC INQUIRY ARE ACTING IRRESPONSIBLY. NOT EVERYONE WHO PROCLAIMS HIMSELF AN EXPERT, IS AN EXPERT. NOT EVERYONE WITH THE TITLE OF "DOCTOR" MERITS PUBLIC ESTEEM. NOT EVERYONE WHO CLAIMS TO BE ACTING IN THE PUBLIC INTEREST, IS ACTUALLY DOING SO. WE MUST GUARD AGAINST THOSE WHO IN THE NAME OF PUBLIC INTEREST PURSUE FAME THROUGH EXAGGERATION. IT IS EASY TO USE STATISTICS IMPROPERLY TO PREDICT LARGE PROBLEMS OR TO EMPHASIZE RISK, OUT OF CONTEXT. THOSE WHO DO SO CAUSE GREAT HARM BY PREVENTING A BALANCED ASSESSMENT OF THE RISKS, THEREBY DISTORTING PROPER PREVENTIVE AND REMEDIAL ACTIONS.

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*The National Academy of Sciences 1979 Report of the Advisory Committee on the Biological Effects of Ionizing Radiation is in contention over the views of a majority of the committee members on how much smaller the true effects will be.

SINCE THE DOCTOR'S NEW TESTIMONY, THE BOSTON GLOBE HAS BEEN COMPARATIVELY SILENT. TO MY KNOWLEDGE, THE PUBLISHERS HAVE MADE NO MOVE TO RETURN THE AWARD THEY RECEIVED FOR THEIR EARLIER INVESTIGATIVE REPORTING. THERE HAS BEEN NO APOLOGY TO THE WORKERS AND FAMILIES THEY SCARED. THE PUBLISHERS HAVE SOLD NEWSPAPERS AND HAVE NOW MOVED ON TO OTHER ISSUES. I DOUBT IF THIS EXPERIENCE WILL HAVE ANY IMPACT ON THEIR FUTURE REPORTING.

WHEN A NEWSPAPER TEAMS UP WITH A DOCTOR AND THEN RUSHES PRELIMINARY, UNSUBSTANTIATED RESULTS INTO PRINT, IT DEVELOPS A VESTED INTEREST TO SHOW THAT ITS REPORTS ARE CORRECT. THUS, IT DISCOUNTS OR DOES NOT REPORT INFORMATION WHICH CONFLICTS WITH ITS OWN STAND. THAT IS THE APOGEE OF IRRESPONSIBILITY.

SUCH IRRESPONSIBILITY IS A FAILURE OF NEWSPAPER MANAGEMENT—NOT OF THE REPORTER. MUCH OF THE BLAME FOR OTHER PROBLEMS IN THE MEDIA ALSO LIE WITH MANAGEMENT, WHO SET THE STANDARDS, STYLE, AND TONE, AND CREATE THE PRESSURE FOR INSTANT SENSATIONAL REPORTING.

NUCLEAR POWER

I HAVE SPENT CONSIDERABLE TIME DISCUSSING HOW PUBLIC UNDERSTANDING OF THE TRUE RISKS OF RADIATION HAS BEEN DISTORTED IN THE NAME OF PROTECTING THE ENVIRONMENT. I HAVE CONCENTRATED ON RADIATION, ALTHOUGH THE PROBLEMS I HAVE MENTIONED ARE COMMON TO OTHER ENVIRONMENTAL ISSUES AS WELL. THE PUBLIC PERCEPTION OF RADIATION HAS A DIRECT BEARING ON THE USE OF NUCLEAR POWER IN THIS COUNTRY.

NUCLEAR POWER IS NOT EASY TO DEAL WITH IN THIS COUNTRY BECAUSE IT HAS BECOME A HIGHLY POLARIZED ISSUE. IT INVOLVES INDIVIDUALS' CONCERNS FOR THEMSELVES AND THEIR FAMILIES, AND IT IS A HIGHLY TECHNICAL, SOPHISTICATED TECHNOLOGY. ULTIMATELY, THE DECISION WHETHER WE SHOULD HAVE NUCLEAR POWER IS A POLITICAL ONE—IN THE TRUE SENSE OF THE WORD—THAT IS, ONE MADE BY THE PEOPLE THROUGH THEIR ELECTED REPRESENTATIVES. IT IS ESSENTIAL THAT THE DECISION BE MADE ON THE BASIS OF FACT, NOT RHETORIC, NOR CONJECTURE, OR HOPE; NOR AS A RESULT OF THE WIDESPREAD TENDENCY TO SENSATIONALIZE OR IGNORE THE TRUE LIMITS AND RISKS OF THE ALTERNATIVES.

ACCORDING TO THE ESTIMATES I HAVE ALREADY STATED, THE ACTUAL RADIATION EXPOSURE TO WORKERS AND TO THE PUBLIC FROM TODAY'S USE OF NUCLEAR POWER CAN BE ESTIMATED TO RESULT IN ABOUT ELEVEN EXTRA CANCER DEATHS PER YEAR OUT OF A TOTAL OF 360,000. ON THIS BASIS, TO ELIMINATE NUCLEAR POWER HERE WOULD THEN POTENTIALLY SAVE AN ESTIMATED ELEVEN LIVES PER YEAR, BUT REDUCE THE ENERGY AVAILABLE. THIS LOSS OF ENERGY ITSELF, MIGHT WELL RESULT IN LOSS OF LIFE.

IF THE SAVING OF ELEVEN HUMAN LIVES WERE THE SOLE OBJECTIVE, BETTER RESULTS COULD BE OBTAINED FROM THE FOLLOWING, THAN BY ELIMINATING NUCLEAR POWER:

- REDUCE CIGARETTE CONSUMPTION FOR EACH SMOKER BY ONE CIGARETTE PER YEAR.
- REDUCE MEDICAL RADIATION EXPOSURE BY ONE PERCENT.
- MOVE THE POPULATION OF THE DENVER REGION TO COASTAL AREAS WHICH HAVE LOWER BACKGROUND RADIATION LEVELS.
- ELIMINATE STOCK CAR RACING.
- REDUCE THE OVERWEIGHT CONDITION OF THOSE IN THIS ROOM BY AN AVERAGE OF THREE POUNDS.

SOME ANALYSTS HAVE REPORTED THERE MAY BE GREATER RADIATION EXPOSURE FROM OPERATION OF A COAL-FIRED CENTRAL POWER STATION THAN FROM A NUCLEAR POWER STATION. WHETHER THIS ASSERTION ON RADIATION IS OR IS NOT TRUE, ACCIDENTS IN MINING AND TRANSPORTING COAL, AND THE EFFECTS ON THE PUBLIC FROM SULPHUR AND OTHER POLLUTANTS, RESULT IN A DEMONSTRABLY HIGHER DEATH RATE FROM USE OF COAL THAN FROM NUCLEAR POWER.

CONCERN OVER A NUCLEAR ACCIDENT IS OFTEN CITED AS A REASON FOR PROHIBITING NUCLEAR POWER. OBVIOUSLY, A REPEAT OF THE THREE MILE ISLAND ACCIDENT CANNOT BE LIGHTLY ACCEPTED AND CORRECTIVE ACTIONS ARE CALLED FOR TO PREVENT RECURRENCE. I HAVE PROVIDED MY VIEWS TO CONGRESS AND TO OTHERS RESPONSIBLE FOR ASSESSING WHAT MIGHT BE DONE IN THE COMMERCIAL NUCLEAR POWER PROGRAM. THE RECORD AND RISKS OF THIS SOURCE OF ENERGY SHOULD BE PUT INTO PERSPECTIVE, AS COMPARED WITH OTHER RISKS WE FACE.

HERE ARE SOME EXAMPLES OF ACCIDENTS FAR WORSE THAN ANYTHING RESULTING FROM THREE MILE ISLAND, YET WITHOUT COMPARABLE REPERCUSSIONS ON PUBLIC POLICIES:

IN 1947, A SHIP LOADING AMMONIUM NITRATE FERTILIZER EXPLODED, KILLING 561 PEOPLE AND LEVELING MUCH OF TEXAS CITY, TEXAS.

MANY FIRES, EXPLOSIONS AND WRECKS HAVE OCCURRED IN WHICH MORE PEOPLE THAN THIS WERE KILLED.

FORTY-EIGHT EARTHQUAKES, FLOODS, TIDAL WAVES, AND STORMS HAVE BEEN RECORDED IN EACH OF WHICH 10,000 OR MORE PEOPLE WERE KILLED.

THE DC-10 AIRPLANE WHICH RECENTLY CRASHED, KILLED SEVERAL HUNDRED PEOPLE. NO ONE IS CONSIDERING ABOLISHING AVIATION—IT IS TOO IMPORTANT TO OUR WAY OF LIFE.

I am not aware of anyone advocating relocating cities such as Los Angeles or San Francisco away from geological faults which might cause earthquakes or away from risk of flood or storm damage.

As another example, there are approximately one hundred million shipments of hazardous material annually in this country. Hundreds of people each year are killed or seriously injured by hazardous materials in accidents. More scrutiny is being given to the approximately two million radioactive shipments than to the others, yet not a single death or injury has occurred from radiation or radioactivity in the material being transported.

I am not an expert or particularly knowledgeable in the areas of environmental effects of other forms of power generation. However, I am aware that many knowledgeable people conclude that the total risk involved in the use of nuclear power is no greater than that of any alternate source which can meet our needs in the next few decades.

Today many are optimistic about the possibility of widespread use of solar and other so-called "natural sources of energy." However, in their enthusiasm they often disregard the limitations and environmental effects of these sources. Others advocate exploitation of shale oil deposits without mentioning the vast amounts of water and earth removal required.

Any large-scale generation of energy—whether nuclear or from other sources—involves major engineering difficulties and potential environmental impacts. It is incorrect to assume that technology and increased Government spending can overcome limits nature imposes.

I REMEMBER THE OPTIMISTIC PROJECTIONS MADE FOR NUCLEAR POWER WHEN IT WAS FIRST BEING DEVELOPED. IT WAS PREDICTED THAT ELECTRICITY FROM NUCLEAR POWER WOULD BE TOO CHEAP TO METER. THESE PREDICTIONS SPRANG FROM HOPE, FROM IGNORANCE OF THE ENGINEERING PROBLEMS THAT WOULD BE ENCOUNTERED IN USING NUCLEAR POWER.

IN SIMILAR VEIN, MANY ADVOCATES EXAGGERATE THE BENEFITS AND IGNORE THE PROBLEMS OF THE ENERGY SOURCES THEY ARE PROMOTING. THE SOLUTION TO OUR ENERGY NEEDS IS NOT JUST OVER THE HILL AT THE END OF THE RAINBOW. NATURE ALWAYS DEMANDS ITS PRICE; PROVIDING ADEQUATE AMOUNTS OF ENERGY WILL EXACT ITS PROPER PRICE.

CONCLUSION

THE TECHNICAL PROBLEMS INVOLVED IN DEVELOPING ADDITIONAL SOURCES OF ENERGY ARE GREAT, AND WILL REQUIRE OUR BEST TALENT.

I AM NOT A PROPONENT OF NUCLEAR POWER OR OF ANY OTHER ENERGY SOURCE. ALL ALTERNATIVES HAVE THEIR OWN LIMITATIONS; NONE ARE WITHOUT RISK.

IN ADDITION TO THE TECHNICAL PROBLEMS OF GENERATING THE ENERGY, ENVIRONMENTAL CONCERNS MUST BE FACTORED INTO THE EQUATION. WHETHER THESE CAN BE SOLVED ON A SCALE ENABLING US TO SUSTAIN OUR PRESENT STANDARD OF LIVING IS NOT CLEAR AT THIS TIME.

ONE THING IS CLEAR. THESE PROBLEMS CANNOT BE DEALT WITH EFFECTIVELY—FROM A TECHNICAL OR POLITICAL STANDPOINT—IF THOSE RESPONSIBLE ARE NOT SET FREE TO WORK ON THE PROBLEMS. WE CANNOT MAKE PROGRESS UNLESS THOSE TRULY INTERESTED IN SOLVING THESE PROBLEMS ACT RESPONSIBLY.

TOO MANY SO-CALLED TECHNICAL, MEDICAL, AND SCIENTIFIC PEOPLE HAVE BEEN ABROGATING THEIR PROFESSIONAL RESPONSIBILITY TO PRESENT FACTS ACCURATELY AND OBJECTIVELY AND IN A CONTEXT WHICH ENABLES OTHERS TO EVALUATE THEM.

TOO MANY IN THE MEDIA ARE SENSATIONALIZING THE NEWS IN AN ATTEMPT TO ATTRACT READERS, GENERATE CONTROVERSY, AND MAKE A NAME FOR THEMSELVES.

TOO MANY SELF-PROCLAIMED PUBLIC INTEREST ADVOCATES ARE PUSHING SINGLE INTEREST IDEAS IN WAYS THAT MAKE IT INCREASINGLY DIFFICULT TO PLACE THE ISSUES IN TRUE PERSPECTIVE.

TOO MANY, IN EXERCISING THEIR SO-CALLED RIGHTS, ARE EXPLOITING ENVIRONMENTAL ISSUES TO OBTAIN GRANTS FROM THE GOVERNMENT; THROUGH STUDY CONTRACTS, IMPROPER INJURY CLAIMS AND OTHER METHODS.

THESE CONFLICTING PRESSURES HAVE LEFT THE PUBLIC UNCERTAIN, DISTRUSTFUL, CONFUSED, AND IN NEED OF HELP. I CONSIDER THIS AUDIENCE CAN PROVIDE A SIGNAL SERVICE BY ANSWERING THIS CALL FOR HELP. ENVIRONMENTAL ISSUES MUST BE PUT INTO PROPER PERSPECTIVE. BALANCING RISKS AND BENEFITS MUST BECOME A STANDARD APPROACH TO EVALUATING ENVIRONMENTAL MATTERS. THE SIGNIFICANCE OF ENVIRONMENTAL DATA MUST BE EXPLAINED TO THE PUBLIC, SO IT CAN REACH ITS OWN CONCLUSIONS.

THE PRESENT CRISIS IN CONFIDENCE OVER ENERGY REQUIRES THIS APPROACH TO ENVIRONMENTAL ISSUES. THE CHINESE WORD FOR CRISIS COMBINES TWO IDEOGRAPHS, WEI CHI (PRONOUNCED WEIGH GEE) LITERALLY, DANGEROUS OPPORTUNITY. A TIME OF CRISIS IS ALSO A TIME OF OPPORTUNITY. WE SHOULD TAKE ADVANTAGE OF THIS OPPORTUNITY TO ACHIEVE A PROPER PERSPECTIVE IN ENVIRONMENTAL MATTERS.

THIS SPEECH REFLECTS THE VIEWS
OF THE AUTHOR AND DOES NOT
NECESSARILY REFLECT THE VIEWS
OF THE SECRETARY OF THE NAVY
OR THE DEPARTMENT OF THE NAVY

REMARKS OF
ADMIRAL H. G. RICKOVER, USN
AT THE
1981 EGLESTON MEDAL AWARD DINNER
COLUMBIA UNIVERSITY SCHOOL OF ENGINEERING & APPLIED SCIENCE
NEW YORK, N.Y.
NOVEMBER 5, 1981

DOING A JOB

IN 1929 I ATTENDED THE COLUMBIA SCHOOL OF ENGINEERING FOR POST-GRADUATE STUDY IN ELECTRICAL ENGINEERING. COLUMBIA WAS THE FIRST INSTITUTION THAT ENCOURAGED ME TO THINK, RATHER THAN MEMORIZE. MY TEACHERS WERE NOTABLE IN THAT MANY HAD GAINED PRACTICAL ENGINEERING EXPERIENCE OUTSIDE THE UNIVERSITY, AND WERE ABLE TO SHARE THEIR EXPERIENCE WITH THEIR STUDENTS. I AM GRATEFUL, AMONG OTHERS, TO PROFESSORS MORECROFT, HEHRE AND ARENDT. MUCH OF WHAT I HAVE SUBSEQUENTLY LEARNED AND ACCOMPLISHED IN ENGINEERING IS BASED ON THE SOLID FOUNDATION OF PRINCIPLES I LEARNED FROM THEM. I AM THEREFORE ESPECIALLY GRATIFIED BY YOUR INVITATION TO RETURN AND SPEAK THIS EVENING.

IN 1939 I BECAME HEAD OF THE ELECTRICAL SECTION OF THE BUREAU OF SHIPS. IN THIS CAPACITY I WAS RESPONSIBLE FOR THE DESIGN,

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MANUFACTURE, AND OPERATION OF THE ELECTRICAL EQUIPMENT FOR THE NAVY AS IT RAPIDLY EXPANDED THROUGHOUT WORLD WAR II. SINCE 1947, AFTER A YEAR STUDYING NUCLEAR ENGINEERING AT OAK RIDGE, TENNESSEE, I HAVE BEEN RESPONSIBLE FOR THE RESEARCH, DESIGN, CONSTRUCTION AND OPERATION OF THE NUCLEAR REACTORS AND THE PROPULSION MACHINERY OF THE NAVY'S NUCLEAR-POWERED SHIPS; ALSO FOR THE SHIPPINGPORT, PENNSYLVANIA, NUCLEAR POWER STATION – THE FIRST COMMERCIAL NUCLEAR POWER PLANT.

IN THE COURSE OF MY WORK, I HAVE INTERVIEWED MORE THAN 14,000 RECENTLY GRADUATED COLLEGE STUDENTS FOR JOBS IN MY ORGANIZATION AND IN NUCLEAR SHIPS. IN RECENT YEARS A SURPRISING NUMBER OF APPLICANTS, EVEN GRADUATES OF ENGINEERING SCHOOLS AND THE NAVAL ACADEMY, HAVE BECOME ENAMORED WITH THE STUDY OF "MANAGEMENT" – SOME EVEN MAJORING IN THIS SUBJECT.

ALMOST WITHOUT EXCEPTION THEY ARE FLUENT IN THE JARGON OF SYSTEMS ANALYSIS, FINANCIAL MANIPULATION, AND QUANTITATIVE MANAGEMENT. THEY GRADUATE CONVINCED THEY HAVE LEARNED MANAGEMENT TECHNIQUES THAT WILL ENABLE THEM TO ADMINISTER ANY JOB. YET MOST SEEM TO HAVE AN UNREALISTIC PERCEPTION OF WHAT IS ACTUALLY INVOLVED, WITH LITTLE APPRECIATION OF THE IMPORTANCE OF TECHNICAL KNOWLEDGE, EXPERIENCE, AND HARD WORK.

MANY WHO TEACH "MANAGEMENT" IN OUR UNIVERSITIES DO THEIR STUDENTS AND SOCIETY A DISSERVICE. BY FOCUSING ON THE TECHNIQUES OF "MODERN MANAGEMENT", THEY PROMOTE THE IDEA THAT BY MASTERING A FEW SIMPLE PRINCIPLES OF HOW TO HANDLE PEOPLE AND SITUATIONS ONE CAN BECOME A UNIVERSAL MANAGER: CAPABLE OF RUNNING ANY JOB

WITHOUT HAVING TO KNOW MUCH ABOUT THE WORK TO BE MANAGED.

OUR FACTORIES AND COMPANIES ARE INCREASINGLY BEING BOUGHT, SOLD, AND OPERATED BY PROFESSIONAL ADMINISTRATORS, LAWYERS, AND FINANCIAL EXPERTS WHO HAVE LITTLE UNDERSTANDING OF THEIR PRODUCTS, THE TECHNOLOGY INVOLVED, OR THE NEEDS OF CUSTOMERS. AS THESE PROFESSIONAL "MANAGERS" REACH TOP CORPORATE POSITIONS, OTHERS EMULATE THEM AND AVOID TECHNICAL EDUCATION IN FAVOR OF MANAGEMENT STUDIES. IN MY OPINION, OUR UNIVERSITIES SHOULD EMPHASIZE THE IMPORTANCE OF A SOLID GROUNDING IN SUBSTANTIVE LEARNING AND DOWN-GRADE SO-CALLED MANAGEMENT SCIENCE.

WHAT IT TAKES TO DO A JOB WILL NOT BE LEARNED FROM MANAGEMENT COURSES. IT IS PRINCIPALLY A MATTER OF EXPERIENCE, THE PROPER ATTITUDE, AND COMMON SENSE - NONE OF WHICH CAN BE TAUGHT IN A CLASSROOM.

AFTER A LIFETIME OF WORK I CONCLUDE THAT WHAT CAN BE SAID ABOUT DOING A JOB IS HARDLY ENOUGH FOR ONE LECTURE, LET ALONE AN ENTIRE FIELD OF STUDY. THE KEY POINTS OF SUCH A LECTURE I WOULD SUMMARIZE AS FOLLOWS:

HUMAN EXPERIENCE SHOWS THAT PEOPLE, NOT ORGANIZATIONS OR MANAGEMENT SYSTEMS, GET THINGS DONE. FOR THIS REASON SUBORDINATES MUST BE GIVEN AUTHORITY AND RESPONSIBILITY EARLY IN THEIR CAREER. IN THIS WAY THEY DEVELOP QUICKLY AND CAN HELP THE MANAGER DO HIS WORK. THE MANAGER, OF COURSE, REMAINS ULTIMATELY RESPONSIBLE AND MUST ACCEPT THE BLAME IF SUBORDINATES MAKE MISTAKES.

AS SUBORDINATES DEVELOP, WORK SHOULD BE CONSTANTLY ADDED SO THAT NO ONE CAN FINISH HIS JOB. THIS SERVES AS A PROD AND A

CHALLENGE. IT BRINGS OUT THEIR CAPABILITIES AND FREES THE MANAGER TO ASSUME ADDED RESPONSIBILITIES. AS MEMBERS OF THE ORGANIZATION BECOME CAPABLE OF ASSUMING NEW AND MORE DIFFICULT DUTIES, THEY DEVELOP PRIDE IN DOING THE JOB WELL. THIS ATTITUDE SOON PERMEATES THE ENTIRE ORGANIZATION.

ONE MUST PERMIT HIS PEOPLE THE FREEDOM TO SEEK ADDED WORK AND GREATER RESPONSIBILITY. IN MY ORGANIZATION, THERE ARE NO FORMAL JOB DESCRIPTIONS OR ORGANIZATION CHARTS. RESPONSIBILITIES ARE DEFINED IN A GENERAL WAY, SO THAT PEOPLE ARE NOT CIRCUMSCRIBED. ALL ARE PERMITTED TO DO AS THEY THINK BEST; ALSO TO GO TO ANYONE AND ANYWHERE FOR HELP. EACH PERSON THEN IS LIMITED ONLY BY HIS OWN ABILITY.

COMPLEX JOBS CANNOT BE ACCOMPLISHED EFFECTIVELY WITH TRANSIENTS. THEREFORE, A MANAGER MUST MAKE THE WORK CHALLENGING AND REWARDING SO THAT HIS PEOPLE WILL REMAIN WITH THE ORGANIZATION FOR MANY YEARS. THIS ALLOWS IT TO BENEFIT FULLY FROM THEIR KNOWLEDGE, EXPERIENCE, AND "CORPORATE" MEMORY.

THE DEFENSE DEPARTMENT DOES NOT RECOGNIZE THE NEED FOR CONTINUITY IN IMPORTANT JOBS. IT ROTATES OFFICERS EVERY FEW YEARS BOTH AT HEADQUARTERS AND IN THE FIELD. THE SAME APPLIES TO THEIR CIVILIAN SUPERIORS.

THIS SYSTEM VIRTUALLY ENSURES INEXPERIENCE AND NON-ACCOUNTABILITY. BY THE TIME AN OFFICER HAS BEGUN TO LEARN A JOB, IT IS TIME FOR HIM TO ROTATE. UNDER THIS SYSTEM, INCUMBENTS CAN BLAME THEIR PROBLEMS ON PREDECESSORS. THEY ARE ASSIGNED TO ANOTHER JOB BEFORE THE RESULTS OF THEIR WORK BECOME EVIDENT. SUBORDINATES CANNOT BE

EXPECTED TO REMAIN COMMITTED TO A JOB AND PERFORM EFFECTIVELY WHEN THEY ARE CONTINUOUSLY ADAPTING TO A NEW JOB OR TO A NEW BOSS.

WHEN DOING A JOB - ANY JOB - ONE MUST FEEL THAT HE OWNS IT, AND ACT AS THOUGH HE WILL REMAIN IN THAT JOB "FOREVER". HE MUST LOOK AFTER HIS WORK JUST AS CONSCIENTIOUSLY AS THOUGH IT WERE HIS OWN BUSINESS AND HIS OWN MONEY. IF HE FEELS HE IS ONLY A TEMPORARY CUSTODIAN, OR THAT THE JOB IS JUST A STEPPING STONE TO A HIGHER POSITION, HIS ACTIONS WILL NOT TAKE INTO ACCOUNT THE LONG-TERM INTERESTS OF THE ORGANIZATION. HIS LACK OF COMMITMENT TO THE PRESENT JOB WILL BE PERCEIVED BY THOSE WHO WORK FOR HIM, AND THEY, LIKEWISE, WILL TEND NOT TO CARE. TOO MANY SPEND THEIR ENTIRE WORKING LIVES LOOKING FOR THE NEXT JOB. WHEN ONE FEELS HE OWNS HIS PRESENT JOB AND ACTS THAT WAY, HE NEED HAVE NO CONCERN ABOUT HIS NEXT JOB.

IN ACCEPTING RESPONSIBILITY FOR A JOB, A PERSON MUST GET DIRECTLY INVOLVED. EVERY MANAGER HAS A PERSONAL RESPONSIBILITY, NOT ONLY TO FIND PROBLEMS, BUT TO CORRECT THEM. THIS RESPONSIBILITY COMES BEFORE ALL OTHER OBLIGATIONS; BEFORE PERSONAL AMBITION OR COMFORT.

A MAJOR FLAW IN OUR SYSTEM OF GOVERNMENT, AND EVEN IN INDUSTRY, IS THE LATITUDE ALLOWED TO DO LESS THAN IS NECESSARY. TOO OFTEN OFFICIALS ARE WILLING TO ACCEPT AND ADAPT TO SITUATIONS THEY KNOW TO BE WRONG. THE TENDENCY IS TO DOWN-PLAY PROBLEMS INSTEAD OF ACTIVELY TRYING TO CORRECT THEM. RECOGNIZING THIS, MANY SUBORDINATES GIVE UP, CONTAIN THEIR VIEWS WITHIN THEMSELVES, AND WAIT FOR OTHERS TO TAKE ACTION. WHEN THIS HAPPENS, THE

MANAGER IS DEPRIVED OF THE EXPERIENCE AND IDEAS OF SUBORDINATES WHO GENERALLY ARE MORE KNOWLEDGEABLE THAN HE IN THEIR PARTICULAR AREAS.

A MANAGER MUST INSTILL IN HIS PEOPLE AN ATTITUDE OF PERSONAL RESPONSIBILITY FOR SEEING A JOB PROPERLY ACCOMPLISHED. UNFORTUNATELY, THE SENSE OF PERSONAL RESPONSIBILITY FOR DOING A JOB RIGHT SEEMS TO BE DECLINING, PARTICULARLY IN LARGE ORGANIZATIONS WHERE RESPONSIBILITY IS BROADLY DISTRIBUTED. TO COMPLAINTS OF A JOB POORLY DONE, ONE OFTEN HEARS THE EXCUSE "I AM NOT RESPONSIBLE". I BELIEVE THAT IS LITERALLY CORRECT. THE MAN WHO TAKES SUCH A STAND IN FACT IS NOT RESPONSIBLE; HE IS IRRESPONSIBLE. WHILE HE MAY NOT BE LEGALLY LIABLE, OR THE WORK MAY NOT HAVE BEEN SPECIFICALLY ASSIGNED TO HIM, NO ONE INVOLVED IN A JOB CAN DIVEST HIMSELF OF RESPONSIBILITY FOR ITS SUCCESSFUL COMPLETION.

UNLESS THE INDIVIDUAL TRULY RESPONSIBLE CAN BE IDENTIFIED WHEN SOMETHING GOES WRONG, NO ONE HAS REALLY BEEN RESPONSIBLE. WITH THE ADVENT OF MODERN MANAGEMENT THEORIES IT IS BECOMING COMMON FOR ORGANIZATIONS TO DEAL WITH PROBLEMS IN A COLLECTIVE MANNER, BY DIVIDING PROGRAMS INTO SUB-PROGRAMS, WITH NO ONE LEFT RESPONSIBLE FOR THE ENTIRE EFFORT. THERE IS ALSO THE TENDENCY TO ESTABLISH MORE AND MORE LEVELS OF MANAGEMENT, ON THE THEORY THAT THIS GIVES BETTER CONTROL. THESE ARE BUT DIFFERENT FORMS OF SHARED RESPONSIBILITY, WHICH EASILY LEAD TO NO ONE BEING RESPONSIBLE - A PROBLEM THAT OFTEN INHERES IN LARGE CORPORATIONS AS WELL AS IN THE DEFENSE DEPARTMENT.

WHEN I CAME TO WASHINGTON BEFORE WORLD WAR II TO HEAD THE

ELECTRICAL SECTION OF THE BUREAU OF SHIPS, I FOUND THAT ONE MAN WAS IN CHARGE OF DESIGN, ANOTHER OF PRODUCTION, A THIRD HANDLED MAINTENANCE, WHILE A FOURTH DEALT WITH FISCAL MATTERS. THE ENTIRE BUREAU OPERATED THAT WAY. IT DIDN'T MAKE SENSE TO ME. DESIGN PROBLEMS SHOWED UP IN PRODUCTION; PRODUCTION ERRORS SHOWED UP IN MAINTENANCE; AND FINANCIAL MATTERS REACHED INTO ALL AREAS. I CHANGED THE SYSTEM. I MADE ONE MAN RESPONSIBLE FOR HIS ENTIRE AREA OF EQUIPMENT – FOR DESIGN, PRODUCTION, MAINTENANCE, AND CONTRACTING. IF ANYTHING WENT WRONG, I KNEW EXACTLY AT WHOM TO POINT. I RUN MY PRESENT ORGANIZATION ON THE SAME PRINCIPLE.

A GOOD MANAGER MUST HAVE UNSHAKEABLE DETERMINATION AND TENACITY. DECIDING WHAT NEEDS TO BE DONE IS EASY, GETTING IT DONE IS MORE DIFFICULT. GOOD IDEAS ARE NOT ADOPTED AUTOMATICALLY. THEY MUST BE DRIVEN INTO PRACTICE WITH COURAGEOUS IMPATIENCE. ONCE IMPLEMENTED THEY CAN BE EASILY OVERTURNED OR SUBVERTED THROUGH APATHY OR LACK OF FOLLOW-UP, SO A CONTINUOUS EFFORT IS REQUIRED. TOO OFTEN, IMPORTANT PROBLEMS ARE RECOGNIZED BUT NO ONE IS WILLING TO SUSTAIN THE EFFORT NEEDED TO SOLVE THEM.

NOTHING WORTHWHILE CAN BE ACCOMPLISHED WITHOUT DETERMINATION. IN THE EARLY DAYS OF NUCLEAR POWER, FOR EXAMPLE, GETTING APPROVAL TO BUILD THE FIRST NUCLEAR SUBMARINE – THE NAUTILUS – WAS ALMOST AS DIFFICULT AS DESIGNING AND BUILDING IT. MANY IN THE NAVY OPPOSED BUILDING A NUCLEAR SUBMARINE. THEY ARGUED THAT SINCE DIESEL SUBMARINES HAD BEEN ADEQUATE FOR WORLD WAR II OPERATIONS, WE DID NOT NEED A NEW AND MORE EXPENSIVE TYPE OF SUBMARINE.

IN THE SAME WAY, THE NAVY ONCE VIEWED NUCLEAR POWERED

AIRCRAFT CARRIERS AND CRUISERS AS TOO EXPENSIVE, DESPITE THEIR OBVIOUS ADVANTAGES OF UNLIMITED CRUISING RANGE AND ABILITY TO REMAIN AT SEA WITHOUT VULNERABLE SUPPORT SHIPS. YET TODAY OUR NUCLEAR SUBMARINE FLEET IS WIDELY RECOGNIZED AS OUR NATION'S MOST EFFECTIVE DETERRENT TO NUCLEAR WAR. OUR NUCLEAR POWERED AIRCRAFT CARRIERS AND CRUISERS HAVE PROVEN THEIR WORTH BY DEFENDING OUR INTERESTS ALL OVER THE WORLD – EVEN IN REMOTE TROUBLE SPOTS SUCH AS THE INDIAN OCEAN, WHERE THE CAPABILITY OF OIL-FIRED SHIPS WOULD BE SEVERELY LIMITED BY THEIR DEPENDENCE ON FUEL SUPPLIES.

THE MAN IN CHARGE MUST CONCERN HIMSELF WITH DETAILS. IF HE DOES NOT CONSIDER THEM IMPORTANT, NEITHER WILL HIS SUBORDINATES. YET "THE DEVIL IS IN THE DETAILS". IT IS HARD AND MONOTONOUS TO PAY ATTENTION TO SEEMINGLY MINOR MATTERS. IN MY WORK I PROBABLY SPEND ABOUT 99 PERCENT OF MY TIME ON WHAT OTHERS MAY CALL "PETTY DETAILS". MOST MANAGERS WOULD RATHER FOCUS ON LOFTY POLICY MATTERS. BUT WHEN THE DETAILS ARE IGNORED, THE PROJECT FAILS. NO INFUSION OF POLICY OR LOFTY IDEALS CAN THEN CORRECT THE SITUATION.

TO MAINTAIN PROPER CONTROL ONE MUST HAVE SIMPLE AND DIRECT MEANS TO FIND OUT WHAT IS GOING ON. THERE ARE MANY WAYS OF DOING THIS; ALL INVOLVE CONSTANT DRUDGERY. FOR THIS REASON THOSE IN CHARGE OFTEN CREATE "MANAGEMENT INFORMATION SYSTEMS" DESIGNED TO EXTRACT FROM THE OPERATION THE DETAILS A BUSY EXECUTIVE NEEDS TO KNOW. OFTEN THE PROCESS IS CARRIED TOO FAR. THE TOP OFFICIAL THEN LOSES TOUCH WITH HIS PEOPLE AND WITH THE WORK THAT IS ACTUALLY GOING ON.

ATTENTION TO DETAIL DOES NOT REQUIRE A MANAGER TO DO EVERYTHING HIMSELF. NO ONE CAN WORK MORE THAN 24 HOURS EACH DAY. THEREFORE, TO MULTIPLY HIS EFFORTS, HE MUST CREATE AN ENVIRONMENT WHERE HIS SUBORDINATES CAN WORK TO THEIR MAXIMUM ABILITY. SOME MANAGEMENT EXPERTS ADVOCATE STRICT LIMITS TO THE NUMBER OF PEOPLE REPORTING TO A COMMON SUPERIOR – GENERALLY FIVE TO SEVEN. BUT IF ONE HAS CAPABLE PEOPLE WHO REQUIRE BUT A FEW MOMENTS OF HIS TIME DURING THE DAY, THERE IS NO REASON TO SET SUCH ARBITRARY CONSTRAINTS. SOME 40 KEY PEOPLE REPORT FREQUENTLY AND DIRECTLY TO ME. THIS ENABLES ME TO KEEP UP WITH WHAT IS GOING ON AND MAKES IT POSSIBLE FOR THEM TO GET FAST ACTION. THE LATTER ASPECT IS PARTICULARLY IMPORTANT. CAPABLE PEOPLE WILL NOT WORK FOR LONG WHERE THEY CANNOT GET PROMPT DECISIONS AND ACTIONS FROM THEIR SUPERIOR.

I REQUIRE FREQUENT REPORTS, BOTH ORAL AND WRITTEN, FROM MANY KEY PEOPLE IN THE NUCLEAR PROGRAM. THIS INCLUDES THE COMMANDING OFFICERS OF OUR NUCLEAR SHIPS, THOSE IN CHARGE OF OUR SCHOOLS AND LABORATORIES, AND REPRESENTATIVES AT MANUFACTURERS' PLANTS AND COMMERCIAL SHIPYARDS. I INSIST THEY REPORT THE PROBLEMS THEY HAVE FOUND DIRECTLY TO ME – AND IN PLAIN ENGLISH. THIS PROVIDES THEM UNLIMITED FLEXIBILITY IN SUBJECT MATTER – SOMETHING THAT OFTEN IS NOT ACCOMMODATED IN HIGHLY STRUCTURED MANAGEMENT SYSTEMS. IT ALSO PROVIDES A WAY FOR THEM TO COMMUNICATE THEIR PROBLEMS AND RECOMMENDATIONS TO ME WITHOUT HAVING THEM FILTERED THROUGH OTHERS. THE DEFENSE DEPARTMENT, WITH ITS EXCESSIVE LAYERS OF MANAGEMENT, SUFFERS BECAUSE THOSE AT THE TOP WHO MAKE THE

DECISIONS ARE GENERALLY ISOLATED FROM THEIR SUBORDINATES WHO HAVE THE FIRST HAND KNOWLEDGE.

TO DO A JOB EFFECTIVELY, ONE MUST SET PRIORITIES. TOO MANY PEOPLE LET THEIR "IN" BASKET SET THE PRIORITIES. ON ANY GIVEN DAY, UNIMPORTANT BUT INTERESTING TRIVIA PASS THROUGH AN OFFICE; ONE MUST NOT PERMIT THESE TO MONOPOLIZE HIS TIME. THE HUMAN TENDENCY IS TO WHILE AWAY TIME WITH UNIMPORTANT MATTERS BECAUSE THESE DO NOT REQUIRE MENTAL EFFORT OR ENERGY. SINCE THEY CAN BE EASILY RESOLVED, THEY GIVE A FALSE SENSE OF ACCOMPLISHMENT. THE MANAGER MUST EXERT SELF-DISCIPLINE TO ENSURE THAT HIS ENERGY IS FOCUSED WHERE IT IS TRULY NEEDED.

ALL WORK SHOULD BE CHECKED THROUGH AN INDEPENDENT AND IMPARTIAL REVIEW. IN ENGINEERING AND MANUFACTURING, INDUSTRY SPENDS LARGE SUMS ON QUALITY CONTROL. BUT THE CONCEPT OF IMPARTIAL REVIEWS AND OVERSIGHT IS IMPORTANT IN OTHER AREAS ALSO. EVEN THE MOST DEDICATED INDIVIDUAL MAKES MISTAKES – AND MANY WORKERS ARE LESS THAN DEDICATED. I HAVE SEEN MUCH POOR WORK AND SHEER NONSENSE GENERATED IN GOVERNMENT AND IN INDUSTRY BECAUSE IT WAS NOT CHECKED PROPERLY.

ONE MUST CREATE THE ABILITY IN HIS STAFF TO GENERATE CLEAR, FORCEFUL ARGUMENTS FOR OPPOSING VIEWPOINTS AS WELL AS FOR THEIR OWN. OPEN DISCUSSIONS AND DISAGREEMENTS MUST BE ENCOURAGED, SO THAT ALL SIDES OF AN ISSUE WILL BE FULLY EXPLORED. FURTHER, IMPORTANT ISSUES SHOULD BE PRESENTED IN WRITING. NOTHING SO SHARPENS THE THOUGHT PROCESS AS WRITING DOWN ONE'S ARGUMENTS. WEAKNESSES OVERLOOKED IN ORAL DISCUSSION BECOME PAINFULLY OBVIOUS ON THE WRITTEN PAGE.

WHEN IMPORTANT DECISIONS ARE NOT DOCUMENTED, ONE BECOMES DEPENDENT ON INDIVIDUAL MEMORY, WHICH IS QUICKLY LOST AS PEOPLE LEAVE OR MOVE TO OTHER JOBS. IN MY WORK, IT IS IMPORTANT TO BE ABLE TO GO BACK A NUMBER OF YEARS TO DETERMINE THE FACTS THAT WERE CONSIDERED IN ARRIVING AT A DECISION. THIS MAKES IT EASIER TO RESOLVE NEW PROBLEMS BY PUTTING THEM INTO PROPER PERSPECTIVE. IT ALSO MINIMIZES THE RISK OF REPEATING PAST MISTAKES. MOREOVER, IF IMPORTANT COMMUNICATIONS AND ACTIONS ARE NOT DOCUMENTED CLEARLY, ONE CAN NEVER BE SURE THEY WERE UNDERSTOOD OR EVEN EXECUTED.

IT IS A HUMAN INCLINATION TO HOPE THINGS WILL WORK OUT, DESPITE EVIDENCE OR DOUBT TO THE CONTRARY. A SUCCESSFUL MANAGER MUST RESIST THIS TEMPTATION. THIS IS PARTICULARLY HARD IF ONE HAS INVESTED MUCH TIME AND ENERGY ON A PROJECT AND THUS HAS COME TO FEEL POSSESSIVE ABOUT IT. ALTHOUGH IT IS NOT EASY TO ADMIT WHAT A PERSON ONCE THOUGHT CORRECT NOW APPEARS TO BE WRONG, ONE MUST DISCIPLINE HIMSELF TO FACE THE FACTS OBJECTIVELY AND MAKE THE NECESSARY CHANGES – REGARDLESS OF THE CONSEQUENCES TO HIMSELF. THE MAN IN CHARGE MUST PERSONALLY SET THE EXAMPLE IN THIS RESPECT. HE MUST BE ABLE, IN EFFECT, TO "KILL HIS OWN CHILD" IF NECESSARY AND MUST REQUIRE HIS SUBORDINATES TO DO LIKEWISE. I HAVE HAD TO GO TO CONGRESS AND, BECAUSE OF TECHNICAL PROBLEMS, RECOMMEND TERMINATING A PROJECT THAT HAD BEEN FUNDED LARGELY ON MY SAY-SO. IT IS NOT A PLEASANT TASK, BUT ONE MUST BE BRUTALLY OBJECTIVE IN HIS WORK.

NO MANAGEMENT SYSTEM CAN SUBSTITUTE FOR HARD WORK. A MANAGER WHO DOES NOT WORK HARD OR DEVOTE EXTRA EFFORT CANNOT

EXPECT HIS PEOPLE TO DO SO. HE MUST SET THE EXAMPLE. THE MANAGER MAY NOT BE THE SMARTEST OR MOST KNOWLEDGEABLE PERSON, BUT IF HE DEDICATES HIMSELF TO THE JOB AND DEVOTES THE REQUIRED EFFORT, HIS PEOPLE WILL FOLLOW HIS LEAD.

THE IDEAS I HAVE MENTIONED ARE NOT NEW – PREVIOUS GENERATIONS RECOGNIZED THE VALUE OF HARD WORK, ATTENTION TO DETAIL, PERSONAL RESPONSIBILITY, AND DETERMINATION. AND THESE, RATHER THAN THE HIGHLY TOUTED MODERN MANAGEMENT TECHNIQUES, ARE STILL THE QUALITIES MOST IMPORTANT IN DOING A JOB. TOGETHER THEY EMBODY A COMMON SENSE APPROACH TO MANAGEMENT; ONE THAT CANNOT BE TAUGHT BY PROFESSORS OF MANAGEMENT IN A CLASSROOM.

I AM NOT AGAINST BUSINESS EDUCATION. A KNOWLEDGE OF ACCOUNTING, FINANCE, BUSINESS LAW, AND THE LIKE CAN BE OF VALUE IN A BUSINESS ENVIRONMENT. WHAT I DO BELIEVE IS HARMFUL IS THE IMPRESSION OFTEN CREATED BY THOSE WHO TEACH "MANAGEMENT" THAT ONE WILL BE ABLE TO MANAGE ANY JOB SIMPLY BY APPLYING CERTAIN MANAGEMENT TECHNIQUES, TOGETHER WITH SOME SIMPLE ACADEMIC RULES OF HOW TO MANAGE PEOPLE AND SITUATIONS.

THERE IS CONCERN TODAY OVER THE APPARENT DECLINE IN U.S. PRODUCTIVITY. IN SEARCHING FOR ITS CAUSES WE SHOULD NOT OVERLOOK THE IMPACT OF THE MANY PROFESSIONAL ADMINISTRATORS WHO RUN LARGE CORPORATIONS. THOUGH TRAINED IN MANAGEMENT AT OUR LEADING UNIVERSITIES, THEY ARE OFTEN UNSKILLED IN THE TECHNICAL ASPECTS OF THE COMPANY. AS A RESULT THEY MANAGE LARGELY IN THE TERMS THEY LEARNED AT SCHOOL. TECHNICAL, OPERATIONAL, AND PRODUCTION ISSUES ARE QUICKLY REDUCED TO ISSUES OF NUMBERS AND DOLLARS.

UPON WHICH THEY APPLY THEIR MANAGEMENT TECHNIQUES. ALTHOUGH IN THIS WAY THEY MAY ACHIEVE FINANCIAL BENEFITS, AN OVER-EMPHASIS ON SHORT TERM PROFITS OFTEN IGNORES BROADER ISSUES SUCH AS EFFICIENT PRODUCTION OR PLANNING FOR THE FUTURE. HOW CAN THEY ACT OTHERWISE, WHEN THEY HAVE KNOWLEDGE ONLY OF MANAGEMENT THEORIES LEARNED IN SCHOOL?

UNIVERSITIES MUST ACCEPT THEIR SHARE OF THE BLAME FOR THIS SITUATION. THEY HAVE PLAYED A KEY ROLE IN PROMOTING SO-CALLED MANAGEMENT "SCIENCE", OFTEN AT THE EXPENSE OF MORE SUBSTANTIVE TOPICS SUCH AS ENGINEERING. IF STUDENTS ARE THE COUNTRY'S FUTURE, HOW CAN WE JUSTIFY THIS WASTE OF THEIR TALENT?

THE STUDENTS OF TODAY ATTEND COLLEGE, AS I DID OVER 50 YEARS AGO, TO LAY THE GROUNDWORK FOR THE EXPERTISE THEY WILL DEVELOP ONLY AFTER YEARS OF EXPERIENCE IN THEIR FIELD. IT IS THE OBLIGATION OF COLUMBIA UNIVERSITY, AS IT IS OF ALL COLLEGES, TO SEEK TO PROVIDE THEM A SOLID BASIS UPON WHICH TO BUILD THEIR CAREER - ONE THAT IS REALISTIC AND PRACTICAL. WE WOULD BE FAR BETTER OFF GRADUATING FEWER TECHNICALLY CAPABLE YOUNG MEN WITH REALISTIC IDEAS OF WHAT IT ACTUALLY TAKES TO DO THEIR WORK, THAN TO GRADUATE A LARGER NUMBER HIGHLY SKILLED IN THE TECHNIQUES OF SO-CALLED MANAGEMENT, YET INCAPABLE OF DOING A JOB.

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